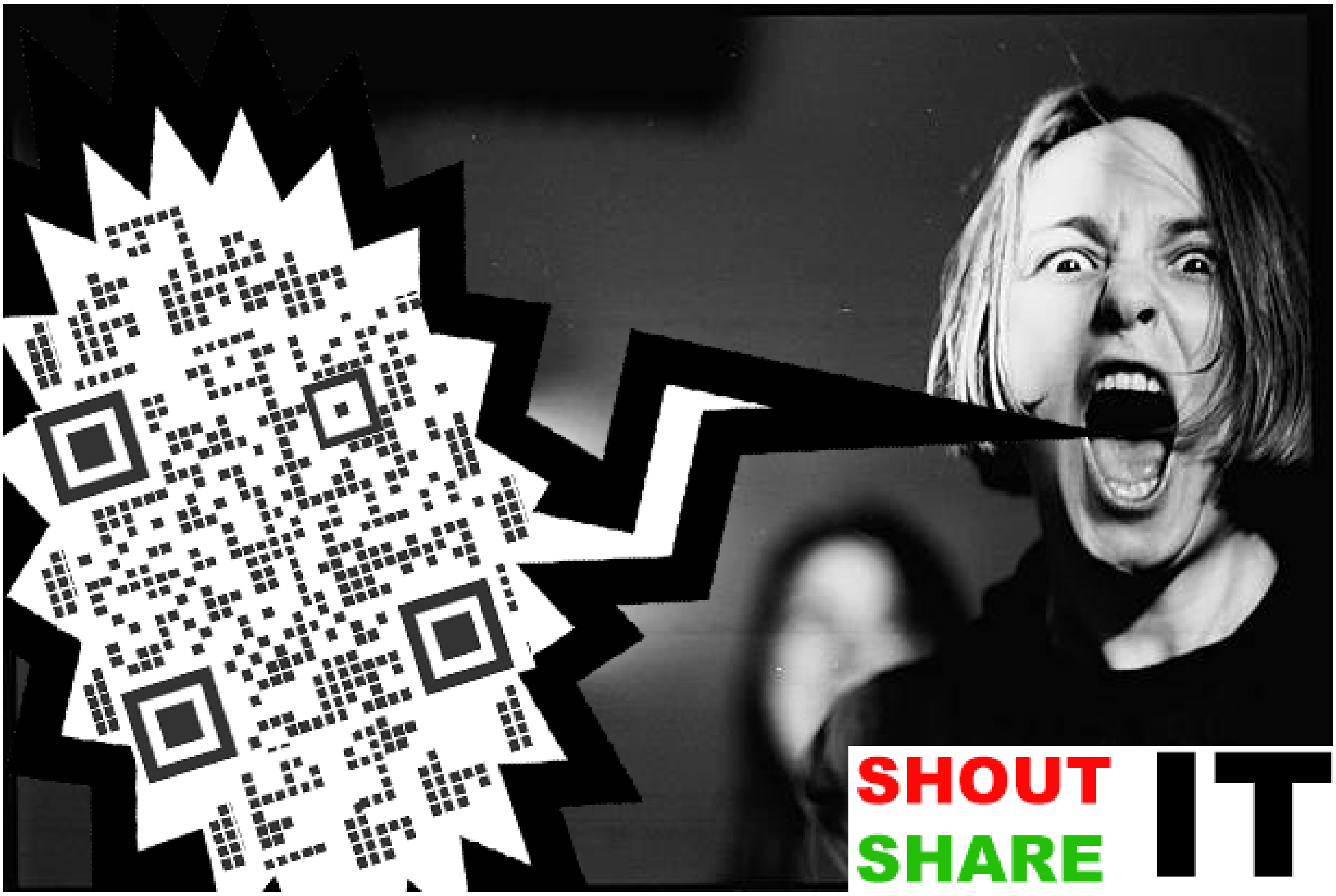
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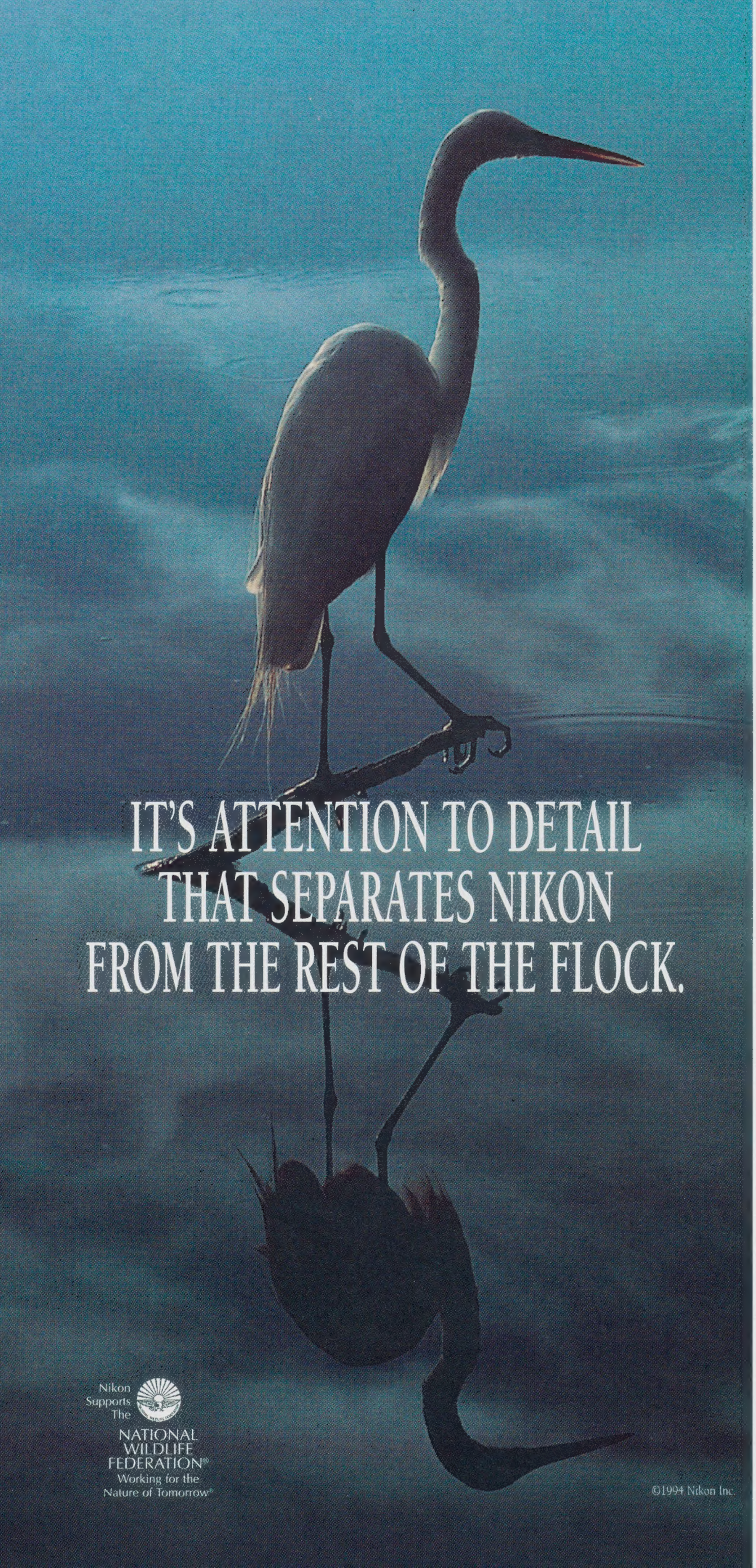
LIVING BIRD

For the Study and Conservation of Birds

WINTER 1995



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LIVING BIRD

WINTER 1995 VOLUME 14 NUMBER 1

Greetings from Sapsucker Woods

It's amazing how often I run into Lab staffers during afterwork hours. Whether I'm going to a movie with my wife, wandering through the Commons downtown with my kids, or even flyfishing at dawn on Fall Creek, wherever I go in the Ithaca area I meet friends from work. Even so, I couldn't help being surprised when I visited Mount Pleasant late one night.

I was supposed to meet Bill Evans, a Lab research associate, near the astronomy observatory at the top of the hill. Bill is working in conjunction with the Lab's Bioacoustics Research Program to develop computer software that will automatically identify the night calls of migrating birds. His truck was nowhere in sight.

This was a rare cloudless night in Ithaca and the observatory was in full swing. Occasionally the building would rumble as its massive domed roof moved to point the telescope at another star. What a strange night, I thought, as I walked into the pitch-black field; the kind of night you expect a UFO to whisk you away to a faraway planet.

Standing still with my eyes closed, I listened to the calls of migrating birds: the catlike sounds of thrushes; the *pink* notes of Bobolinks. Suddenly I had the eerie feeling I was not alone. I opened my eyes just as a disembodied voice inquired: "Who is that?" Several people laughed when I answered.

Martha Fischer and Margaret Barker, fellow staffers in the Lab's Education and Information Services department, and some local birders had been standing there silently as I walked into the field. Later Bill Evans arrived and we all stayed well into the night, trying to learn night call identities from him.

I couldn't help thinking while driving home later, this could only happen in Ithaca.

— Tim Gallagher
Editor-in-Chief

Cover: Looking as crimson as the nearby holly berries, a male Northern Cardinal weathers an icy winter storm. Learn how you can attract these popular visitors and other colorful songbirds to your yard. Story on page 26. Photograph by Gay Bumgarner.

Right: Scientist and artist John O'Neill both discovered and painted the first portrait of this rare parrotlet (*Nannopsittaca dachilleae*). Profile on page 32.

Back Cover: A shy, secretive, largely nocturnal bird, the American Woodcock is a common resident of moist woodlands and thickets in the Eastern United States. A few individuals, like this one, remain through the winter in the northern part of their breeding range. Photograph by Craig Mokma.

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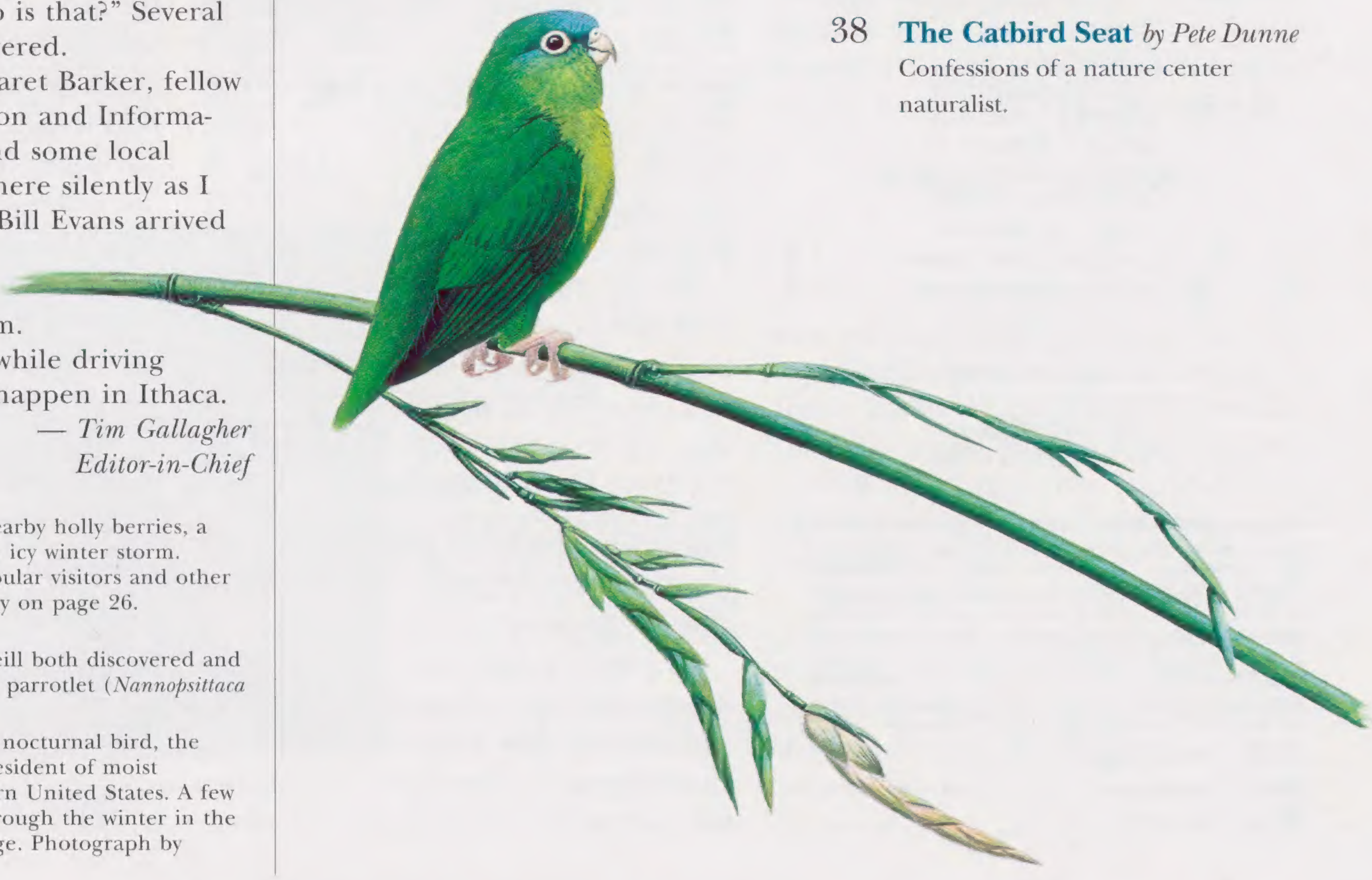

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Letters

BEAUTIFUL BOOKS

I have enjoyed many of the articles in *Living Bird* over the years, but one article in your Summer 1994 issue really caught my interest. That was Jane Hardy's "Birding by the Book." Oh, how I would love to come and see the beautiful rare books that are housed in your collection.

June Boettcher
Ellenton, Florida

TIM GALLAGHER

Library director David Corson and assistant curator Margaret Rogers inspect some of the treasures included in Cornell's Hill Ornithology Collection.

SPANISH BOOKS

I recently read "Counting Birds in Honduras," by Marcia Bonta (Winter 1994). The article mentioned that the *Guide to the Birds of Panama, Costa Rica, Nicaragua, and Honduras* by Robert S. Ridgely and John A. Gwyne was available only in English.

There is an edition of that same book entirely in Spanish. I have a copy, which I purchased at the Smithsonian Tropical Research Institute (STRI) in Panama in December 1993. I don't know whether or not it is available in the United States, but you can order it from STRI or the Panama Audubon Society. The book cost me $34.00 (U.S. dollars).

By the way, I enjoyed the article very much.

Daniel Christian
Shelburne Falls, Massachusetts

IN LIVING COLOR

Regarding the birds pictured in "The Unappreciated Pigeon," by Alexander Skutch (Summer 1994):

In pigeons the genes for the three major plumage colors (ash-red, blue, and brown) are located on the sex chromosomes. The male pigeon has two genes for color on his sex chromosomes; the female has only one. Ash-red is dominant to blue (the color of the wild-type pigeon on page 31), which in turn is dominant to the third major color, brown.

Knowing this, I can tell that the pigeon pictured on page three is a male ash-red check. The black ticking in his primary flight feathers indicates that he is heterozygous for the major colors—he has one gene for ash-red and one gene for blue. A female, because she has only one color gene, could never have this color combination. The genes for the check and bar patterns are not on the sex chromosomes and so can be seen in birds of either sex.

The color of the bird on page 35 is identified as "mealy"; however, so far as I know this term is used only in conjunction with ash-red. The bird looks to me like T-check blue grizzle with some bronzing, but no ash-red.

Sumner H. Fuller
East Hartford, Connecticut

We welcome letters from readers. Address letters to: The Editors, *Living Bird,* 159 Sapsucker Woods Road, Ithaca, New York 14850.

BirdNews

This past June, more than a thousand ornithologists converged in Missoula, Montana, for an historic occasion—the first-ever joint meeting of all three major professional ornithological societies. Members of the American Ornithologists' Union, the Cooper Ornithological Society, and the Wilson Ornithological Society assembled on the University of Montana campus for six days of cutting-edge bird science—reporting their latest discoveries and discussing conservation challenges and research needs for the future. We present here just a sampling of the more than 500 talks, seminars, and posters that made this meeting so fascinating.

KEEP YOUR DISTANCE

The 34,000 pairs of Adélie Penguins that breed on Antarctica's well-named Cape Bird often lose eggs and chicks to the hungry South Polar Skuas that nest nearby. According to University of New Mexico graduate student Julie Hagelin and professor Gary Miller, wandering Adélies sometimes turn the tables on the predators and trample skua eggs.

Hagelin and Miller developed a model to predict the optimum distance between a skua nest and a penguin colony. The researchers ranked the 170 skua nests on the Cape for safety (the farther from penguin pathways, the safer) and access to prey (the fewer skua territories a bird must cross to reach a penguin meal, the better). At the intersection of these two sets of values lay the theoretical "optimal distance."

JULIE HAGELIN

Julie Hagelin demonstrates the optimal distance for studying Adélie Penguins.

How did theory compare with reality? When Hagelin and Miller tracked skua reproductive success, they found that in each year of the four-year study, the birds lost 35 to 50 percent of their eggs. Other skuas ate some, but up to 28 percent got crushed by roaming penguins. Skuas had the lowest reproductive success in the years when they lost the most eggs to penguins.

Hagelin and Miller then compared actual skua-nest distances-to-penguins to the birds' reproductive success. Skuas fledged the most young when they nested 25 to 30 meters from the penguins—a value very close to the predicted optimal distance.

VEHICULAR SELECTION

Anyone who drives a car knows that many birds meet an untimely end on the road. But just how many? No one has ever counted. So, for the past seven years Allegheny College professor Ron Mumme has made road kills a part of his research program.

Mumme is concerned about the effects of speeding cars on Florida Scrub Jays, a species that lives only in dwindling areas of oak scrub habitat. Working at the Archbold Biological Station, he compared death rates between a group of jays that held roadside territories and a control group living away from the highway.

STEPHAN SCHOECH

A Florida Scrub Jay gets a bird's-eye view of Ron Mumme.

Looking at breeding-age birds, Mumme found that the roadside population had an annual mortality rate of 40 percent—nearly twice the death rate of the off-road jays. And experience seemed to make a difference—more than 50 percent of the birds died in their first year on the road. After that, road-wise birds seemed to survive about as well as the control population.

Mumme plans more studies to determine whether older jays have actually learned to avoid traffic, or whether natural selection by unnatural objects has simply eliminated the most vulnerable birds, leaving only road-wary survivors. Meanwhile, he worries: Even though oak scrub for the threatened species is in short supply, roadside habitat might be a "population sink"—killing more birds than it produces.

MANY EYES

If you were walking in the woods and unexpectedly met Steve Lima, you might wonder what he was doing. The Indiana State University professor hides inside a large box while he rolls small rubber balls down a narrow ramp toward a feeding flock of Dark-eyed Juncos and American Tree Sparrows.

The bizarre ball machine is Lima's ingenious invention for prodding the assumptions behind the "many eyes" hypothesis. This ecological truism states that feeding in flocks gives birds an advantage: with many eyes watching for predators, each individual spends

COMPILED BY CYNTHIA BERGER

less time on the lookout and more time eating. An assumption behind the hypothesis is that if a single bird reacts to a threat, everyone else in the flock will notice.

In one set of tests, Lima aimed the ramp so that only a single "target" bird could see the ball coming, then videotaped the flock's reaction. In 69 separate ball attacks, each target bird reacted by looking alert, then flying to cover—but only 4.1 percent of its flockmates showed the slightest reaction to their sentry's behavior.

To demonstrate that a rolling ball really is just as scary as a rushing raptor, Lima also "flew" a stuffed kestrel down his ramp, with the same results: only the target bird flushed.

Another set of tests showed that when the ball was aimed at not one but several birds, they flushed simultaneously—and so did other birds in the flock. Lima concludes that it takes more than one bird to sound the alarm.

A BETTER BIRD COUNT

Suppose you're monitoring a songbird population. How do you get a head count? One common technique is to listen for singing males, then double the number you hear to get the total number of breeding birds.

There's just one problem with this method, says Dalhousie University professor Cynthia Staicer: some males never find a mate. If you assume each singing male represents a pair of birds, you risk overestimating the population.

Staicer and collaborators Victoria Ingalls of Marist College and Tom Sherry of Tulane University set out to build a better bird count. After years of listening in the field, they suspected that a male's song can reveal his paired or unpaired status as concisely as the codes in a personal ad. If female songbirds can decipher the code, so could biologists.

To test this idea, Staicer and Ingalls shouldered tape recorders and collected song samples from more than 100 male American Redstarts. Then they compared each bird's singing style to his pairing status.

ALAN PINDER

Cynthia Staicer stalks singing American Redstarts.

The results were clear: Bachelor males usually sang in *repeat* mode, persistently spouting a single song with a fast, regular cadence. Paired males sang repeat mode more slowly than bachelors did—five versus eight songs per minute. But they were far more likely to sing in *serial* mode, switching back and forth between two or more songs, which they sang faster—10 songs per minute—but more sporadically.

The potential for applying these findings to bird censuses is exciting. Meanwhile, Staicer is examining whether other aspects of a bird's life, such as territory quality, number of neighbors, and nesting stage, might also be revealed in song.

OF CONES AND CROSSBILLS

The lower part of a crossbill's unusual, X-shaped beak may curve either to right or left. In human populations, right-handedness is much more common than left-handedness, but in Red Crossbill populations the ratio of right- to left-beaked birds is 1:1. New Mexico State University professor Craig Benkman wondered whether this ratio was a consequence of the birds' foraging behavior.

Benkman knew that right- and left-beaked birds orient themselves differently when they perch next to a cone; as a result, they reach different seeds. What's more, crossbills forage in flocks, and instead of cleaning out a cone in one visit, they'll take a few seeds, move on, and come back later. Benkman reasoned that flocks with equal numbers of right- and left-beaked birds would forage more efficiently because they'd minimize the overlap in their use of cones.

To test this idea, Benkman wired an empty pinecone to a branch and rounded up 10 Red Crossbills—five left-beaked and five right-beaked. In a series of aviary trials, he hid four seeds in the cone and let a bird forage until it ate two seeds. Next, he let a second bird forage. Time analyses showed that crossbills found seeds faster when they followed an opposite-beaked bird than they did in the wake of a same-beaked bird.

What do these results mean? If, long ago, the crossbill beak ratio was once different from 1:1, birds with the rarer beak type would have an advantage—they'd find food fast. Over time, natural selection would favor the rarer beak, until the two beak types were equally common in the population.

POLYUNSATURATED HABITAT

In spring New Hampshire's Hubbard Brook Experimental Forest resonates with the *I am so la-zee* songs of male Black-throated Blue Warblers who are (contrary to the mnemonic for their song) energetically claiming territories. Not every male gets to breed, though, and years of field work by various scientists suggested "habitat saturation"—not enough high-quality territories to go around. The evidence for habitat saturation? If you remove a breeding male from his territory, another male quickly takes his place.

But Dartmouth College graduate student Peter Marra and professor Dick Holmes weren't satisfied with this explanation. Classic "removal experiments" removed males but left females on the territories. Perhaps, Marra and Holmes thought, these females were attracting new mates. In other words, females, not habitat, might be the limiting factor. It was time to do

NICK RODENHOUSE

Are females a limiting resource? This male Black-throated Blue Warbler did find a mate.

the second part of the experiment.

On one set of eight territories, they removed only the male warblers. In another set of seven territories, they removed both males and females. The results were clear-cut: where the males were removed, eight more males quickly replaced them. But where males *and* females were removed, no new birds moved in.

As additional support for the "females are limiting" theory, Marra and Holmes note that in many songbird species (including Black-throated Blue Warblers) males are more numerous than females. Why? Perhaps more females die during the breeding season, especially once they start flying to and from the nest to feed young. Other preliminary evidence suggests that females settle on wintering grounds in the tropics that are drier and less productive than the turf staked out by males.

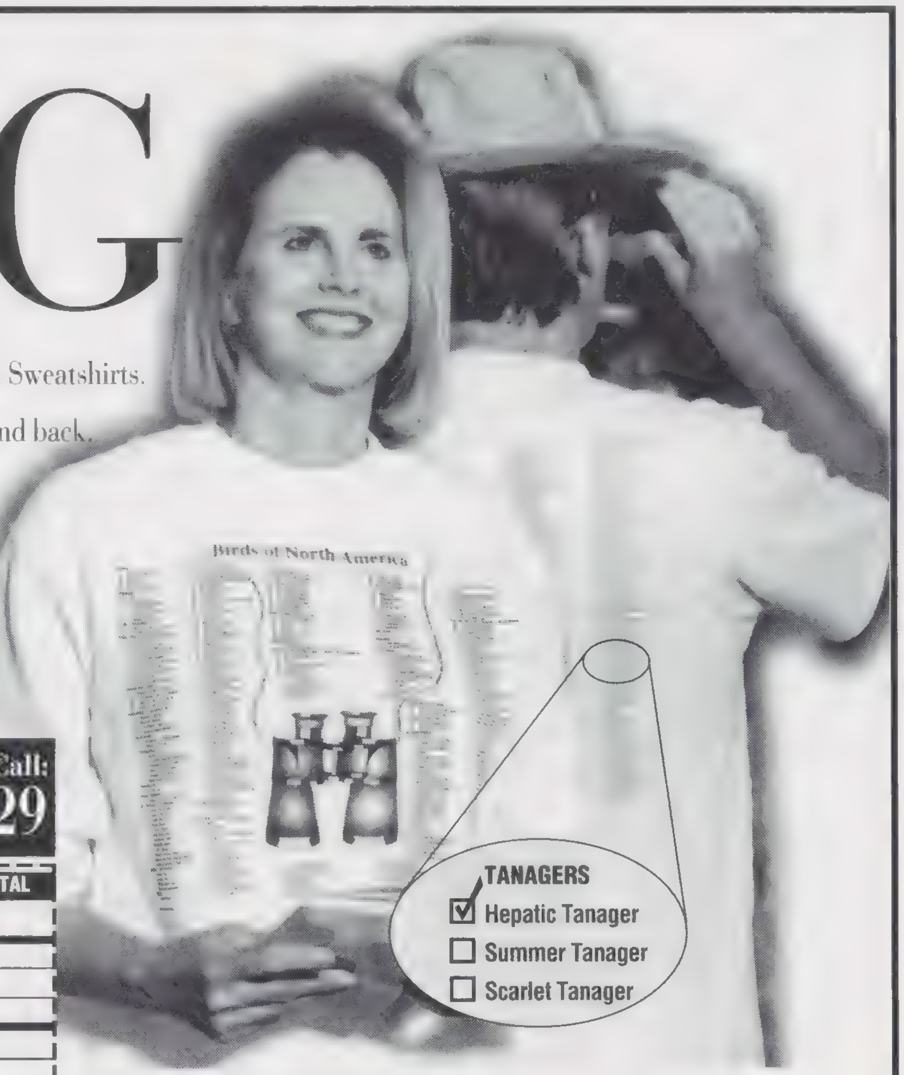
WREN VERSUS WREN

When Albion College professor Dale Kennedy and collaborator Douglas White were instructors at Kansas State University, they maintained a nest box trail on the Konza Prairie Research Natural Area. Each year, Bewick's Wrens and House Wrens moved right in, and the two species seemed to coexist peacefully, contradicting the notion that aggressive House Wrens might be responsible for recent, mysterious declines in some Bewick's populations.

But things aren't always what they seem. For three years Kennedy and White kept track of each wren pair's success in hatching eggs and fledging young. They also measured wren aggression by placing a dummy nest near each nest box, then monitoring the fate of the two House Sparrow eggs stashed inside.

The results? Bewick's Wrens ignored the dummy eggs, for the most part. But House Wrens—males that were unmated, or females that hadn't yet laid eggs—punctured or removed every dummy egg. And their aggressiveness extended to real Bewick's nests—often, when Kennedy and White discovered ruined Bewick's eggs, they saw a male House Wren perched conspicuously nearby, singing. Over the course of the study, Kennedy and White attributed 81 percent of all Bewick's nest failures to House Wrens.

These results suggest House Wrens are indeed directly responsible for the Bewick's decline. Even small numbers of unmated male House Wrens, says Kennedy, can do serious damage.



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FIGHTING FIELD GUIDE OVERLOAD

by *Jack Connor*

Take the frustration, but not the thrill, out of bird identification

Encouraging new birders to use a field guide seems as natural as asking a class of novice swimmers to splash water on their faces, but anyone who has led a bird walk for beginners has seen field guide overload take its toll.

"Meadowlark!" we shout. "See that black 'V' and those white outer tail feathers? . . . Cliff Swallow—watch for the rusty rump patch . . . Bobolink—hear that bubbling song?" By the third or fourth species most people in the group have stopped lifting their binoculars and, heads down, are thumbing back and forth through the field guide—complete with 500+ species in taxonomic order, juvenal/female/male plumages, breeding/wintering ranges, bill colors, wing bars, upper mandibles, undertail coverts, confusing fall warblers, look-alike sandpipers, impossible flycatchers, and all the rest—trying to find something to match one of the birds they have only glimpsed.

By the tenth or twentieth species enthusiasm is waning, fatigue is waxing, and the group is beaten. "How can anyone possibly remember all this stuff?" they ask. "Why don't they put these birds in alphabetical order?" "When do we eat?"

Some novices recover quickly, of course, and come back better prepared and ready and willing for another try on the next trip. And some leaders are so skilled at making the complex seem simple that they can push their group right through the first day syndrome with hardly a bump. Still, I think we lose many potential birders because species identification is so daunting to raw beginners, and for the last year or so I have been experimenting with a very different approach on field trips for novices.

The new method grew out of an earlier experiment that failed. "Let's leave the field guides closed," I tried telling people. "We won't worry about naming the birds. We'll just see what we can notice." That format didn't work because the game was gone. A bird walk without naming is a walk without thrills.

"Let's leave the field guides closed," I tell my group nowadays. "Let's not worry about identifying the species. Let's try to identify how they feed themselves." Our text is a single page—the inside cover of *The Birder's Handbook* by Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye (EDW, hereafter)—that illustrates with icons the 18 primary foraging methods of North American birds.

The biggest advantage of this exercise is that no previous experience is necessary. It generally takes novices two or three weeks before they can thumb through their field guides fast enough to match bird to illustration before the bird flies away. Even someone who has never identified a bird can master EDW's 18 foraging icons in an hour or two. And you know you have your group hooked when someone points to a vulture in the sky and asks, "Is that bird on high patrol?" and someone else points to a woodpecker and calls out, "Look! Bark gleaning!" The thrill of identification is still there, and anyone can share in it.

Because EDW's chart is so simple—18 black-and-white sketches—the people in your group waste no time thumbing pages. They keep their binoculars to their eyes, watching real birds in the real world. Instead of field marks, the focus becomes biology and ecology, and two simple truths are demonstrated immediately: birds spend most waking hours foraging, and their physical features are linked to their feeding methods. Birds that live by "stalk and strike" have long necks and long legs; birds that "aerial forage" have short necks, small bodies, and proportionately large wings. A third truth becomes evident shortly: most birds are specialized feeders. Swallows never stalk and strike; herons never aerial forage.

This basic information may be taken for granted by experienced birders, but it is news to most novices—and it enables them to make sense of biological differences *before* they study field marks. Gulls need not be distinguished from terns only by subtle and

TIM GALLAGHER

The Snowy Egret is a classic "stalk and strike" forager.

apparently arbitrary field marks—wing breadth, tail shape, bill size, and so on—they can be separated by an obvious behavioral difference: terns dive, gulls do not. Nuthatches might look like titmice to novice birders trying to learn by the field-marks-first method, but they'll have much less trouble if they learn that nuthatches are bark gleaners, titmice are foliage gleaners.

Using this "How is it feeding itself?" system regularly has also encouraged me to grow more alert to foraging methods in my own birding and fill in some large gaps of ignorance. Try it yourself on your next walk. How many foraging methods can you spot in an hour, or in a day? How specialized are the common species in your neighborhood? Do nuthatches ever foliage glean? Do thrashers ever hawk? Which species most often use alternate methods? Which species never change their basic method? Are there any species whose favorite method in your locality seems *not* to be the method listed by EDW?

And for those who need more encouragement, here's a foraging-methods quiz to test your expertise.

1. Can you name the three North American woodpeckers whose primary method is *not* bark gleaning? (Hint: One is primarily a ground gleaner; the other two hawk for insects.)

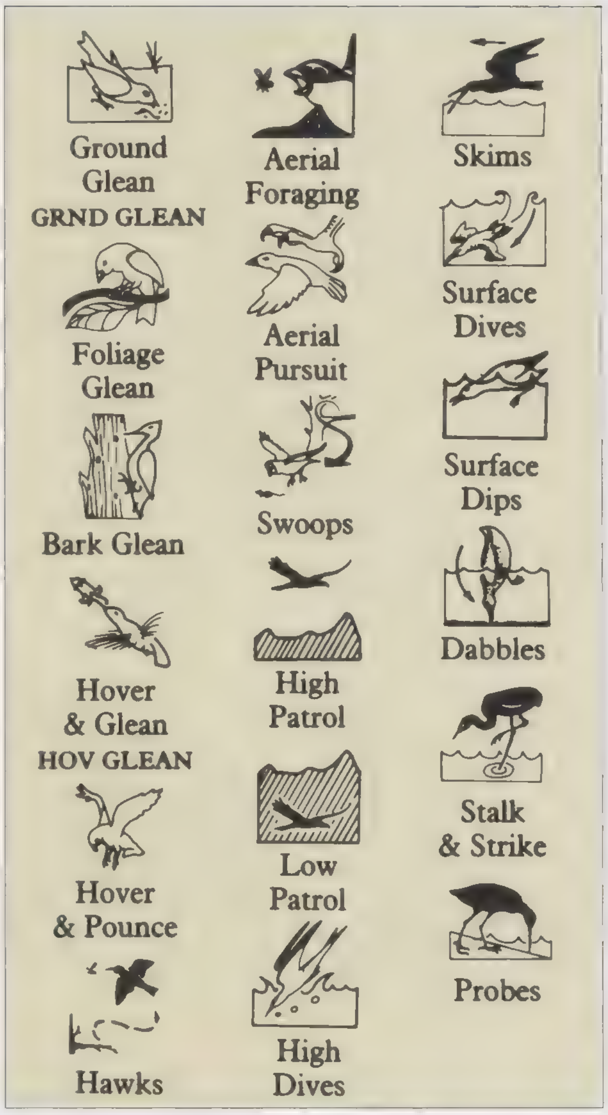
2. Can you name the one member of the heron family whose primary method is not stalk and strike?

3. How about the one dabbling duck that more often ground gleans than dabbles (at least according to EDW)?

4. Two birds employ foraging methods unlike any other species in North America. One is the Greater Flamingo, which filter feeds. Can you name the other bird? (Hint: It is a very well-known western bird.)

5. At least eight other birds use foraging methods not among EDW's primary 18. How many can you name? (Hint: Three are foliage browsers, two are sweepers, and three are diggers.)

6. Piracy doesn't get an icon in EDW because no North American species lives primarily by stealing food from other birds. At least 10 species employ piracy as a secondary method, however. How many of those pirates can you name?



SHAHID NAEEM

Eighteen icons from The Birder's Handbook *make it easy to identify birds by their foraging methods.*

The answers to these questions can be found on page 16. I also have some questions whose answers I don't know. Is there any site in North America where a birder could witness all 18 of EDW's primary foraging methods in, say, a week of birding? Would it be possible to see all 18 in one day (a Foraging Big Day)? We'd need a site with skimmers, hummingbirds, diving ducks (or cormorants), and a mix of raptors. Anyone have a nomination?

What species in North America employs the widest variety of these methods? I can think of several birds that use five methods and one bird that uses six (ground gleaning, high dives, piracy, high patrol, low patrol, aerial foraging, and surface dips). Are there other birds that use six different methods? Are there any birds that use seven?

I'd like to hear from any readers who can answer these last few questions, and from anyone with observations or questions on the foraging behavior of birds. Please write to me c/o *Living Bird*, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. ■

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A Guide to Choosing Birding Tours

by Kenn Kaufman

Planning a bird-watching trip? Read these valuable tips on how to make the most of your travel dollar.

ART WOLFE

Bird-watching groups now travel to the farthest reaches of the globe to see new species. Above, a group takes a close-up look at some nesting Gray-headed Albatrosses on the grassy slopes of South Georgia Island.

Picture this: You awaken in a foreign land, a place where many of the birds don't match anything you can find in your field guide, and where the bird calls are profoundly unfamiliar. No birding sites are marked on your map, and you can't speak the local language or read the road signs . . .

Is this a birder's nightmare? Not necessarily. In fact, it might be a birder's dream if you're on a guided tour with experts who know the country and its birds, and who have arranged every detail of travel for you.

The birding tour industry has gone through a spectacular expansion during the last two decades. We now have hundreds of tour offerings from which to choose, ranging in length from weekends to month-long extravaganzas, visiting sites throughout the globe. The plethora of possibilities is enough to bewilder anyone considering a first birding tour. Having watched the tour business

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for a long time, I know that some clients find birding tours to be the greatest vacations imaginable. But I also know that not every tour is right for every bird watcher. This article will provide practical advice on choosing the birding tour that's right for you.

Tour choices: where they go, and who goes there

Where do birding tours go? The short answer is "every place." Or, to be more precise, every place where the birding is good and travel is reasonably safe. Regions with excellent birding, both within North America and farther afield, may be visited by dozens of tours every year.

Birding tour insiders generally recognize several kinds of tours: those run by the "Big Three"—WINGS Inc., Victor Emanuel Nature Tours (VENT), and Field Guides Inc.—those run by smaller "independents," and birding tours run by organizations that are not primarily tour companies. Any of these may offer good value to the traveling birder.

Of the Big Three, both WINGS Inc. and VENT were founded in the mid-1970s, while Field Guides Inc. was founded by former VENT employees in the mid-1980s. All three have similar advantages: a worldwide selection of tours, led by expert birders, backed up by a professional office staff.

Smaller "independent" bird tour companies are more numerous. Such companies are often started by individual birders or naturalists who want to capitalize on their experience by running their own business. With their low overhead, independents can often (but not always) offer lower prices than the large companies for a comparable tour.

Some of the small companies excel in certain niches thanks to the quality of their leaders. KingBird Tours, for example, travels mostly to Asia, and most tours are led by Ben King, a top authority on the region's birds. Borderland Tours features the West and the American tropics, with most trips led by colorful birder/storyteller Rick Taylor. Other small companies have their own strengths.

Tours run as a sideline by other organizations are usually less sharply focused on birds. For example, tours organized by the National Audubon Society are superb for general-interest travelers, but most of the trips (despite the Audubon name) will not satisfy an avid birder. Some tours in this category, however, do have special educational advantages.

The many kinds of birding tours

For the bird watcher who has never gone on an organized birding tour, it may be useful to describe a typical day on a tour. The days invariably begin early, since early morning is when birds are usually most active. You may have the option of taking a walk before breakfast or eating a pre-dawn breakfast before driving out to a birding area. Birding usually continues at a steady pace all morning. Lunch might be a picnic at some birdy site. In hot climates, you might return for lunch and a midday siesta at the hotel before going back out in the late afternoon. If interesting night birds are available, the group might go out on an owling expedition after dinner. The day's activities are often broken into several parts so that you can opt out of some excursions if you need to rest. But where the accommodations are far from the birding spots, you may have no choice but to stay out for the entire day.

Tour group sizes tend to be small—one or two leaders guiding 8 to 20 participants. You may find that the other people in your group are among the best things about a tour. Bird watchers in general are friendly, interesting people, and fun to travel with. Most tour participants have a fair amount of birding experience, but you'll find little snobbery on a tour (except on a few of the hard-core listing trips). A rank beginner who goes on a tour is often "adopted" by the rest of the group, who make sure that he or she gets to see everything. Still, if you're just getting started in birding, you'd be wise to master the use of your binoculars and learn some of the local birds before traveling to a bird-rich tropical region.

On a typical birding tour, the goal is to see a lot of birds and have a good time. But some tours are designed more with education in mind. In the workshops that I run through VENT, for example, we don't even compile a "trip list" of birds, because the focus is entirely on techniques of field identification.

Some outstanding educational offerings come

Names and Addresses of Tour Companies

Borderland Tours, 2550 W. Calle Padilla, Tucson, Arizona 85745. Phone: (800) 525-7753.

Cheesemans' Ecology Safaris, 20800 Kittredge Road, Saratoga, California 95070. Phone: (800) 527-5330.

Field Guides Inc., P.O. Box 160723, Austin, Texas 78716. Phone: (512) 327-4953.

Focus on Nature Tours, P.O. Box 9021, Wilmington, Delaware 19809. Phone: (302) 529-1876.

KingBird Tours, P.O. Box 196, Planetarium Station, New York, New York 10024. Phone: (212) 866-7923.

Massachusetts Audubon Society Natural History Travel, South Great Road, Lincoln, Massachusetts 01773. Phone: (800) 289-9504.

Victor Emanuel Nature Tours (VENT), P.O. Box 33008, Austin, Texas 78764. Phone: (800) 328-VENT.

Voyagers, P.O. Box 915, Ithaca, New York 14851. Phone: (607) 257-3091.

WINGS Inc., P.O. Box 31930, Tucson, Arizona 85751. Phone: (602) 749-1967. FAX: (602) 749-3175.

Wonder Bird Tours, P.O. Box 2015, New York, New York 10159. Phone: (800) BIRD TUR. In New York and Toronto, (212) 736-BIRD. FAX: (212) 736-0965.

not from the major tour companies, but from other organizations. The Institute for Field Ornithology, based in Machias, Maine, runs workshops every summer focusing on popular bird groups, such as warblers and shorebirds. Similar workshops are organized in fall by the Cape May Bird Observatory in New Jersey. The Cornell Lab of Ornithology's Library of Natural Sounds offers a field course each summer on how to record bird vocalizations.

Many tours—including some offered by major bird-tour companies—focus on general natural history rather than birds. Field Guides Inc. was one of the first companies to organize tours to the major monarch butterfly wintering areas in the mountains of Mexico. VENT now has a separate series of natural history tours that visit regions, such as the Ozarks or the Okefenokee Swamp, where birds are not the major attraction. In addition, some tours combine birding with other pursuits. At least two companies offer "Oaxaca at Christmastime" trips—a tradition I started in the early 1980s. Participants spend mornings birding and afternoons exploring the markets, museums, and archaeological sites of this beautiful Mexican city. Each of the "Birds and Music" trips organized by WINGS is built around a major music festival in Europe, with birding scheduled between concerts. Combination trips may be the ideal compromise for couples in which only one person is a birder.

Cruise ship birding tours are in a class by themselves. Ordinarily on a cruise, the birding group is just a subset of the total passenger load, so the itinerary tends to be aimed at general interests. Common sense will tell you which kinds of shipboard birding will be worthwhile. A cruise is the only way to go if you want to see the birds of Antarctica, and it's also the only reasonable way to visit some island groups, such as the Galápagos. But for many other regions, birding by ship doesn't make sense. A birding cruise to Costa Rica, for example, is not a good choice for a serious birder, because most of the country's best bird-watching sites are well inland.

Factors to consider in choosing a tour

If you're looking at a specific tour, you should consider several aspects. One major factor is how much experience the company has in providing tours to your particular destination. After all, one of the greatest advantages in taking a tour is that you don't have to work out all the complicated logistics yourself. But how well can a tour company deal with those details if it's their first trip to an area?

What You Should Know Before Signing Up for a Birding Tour

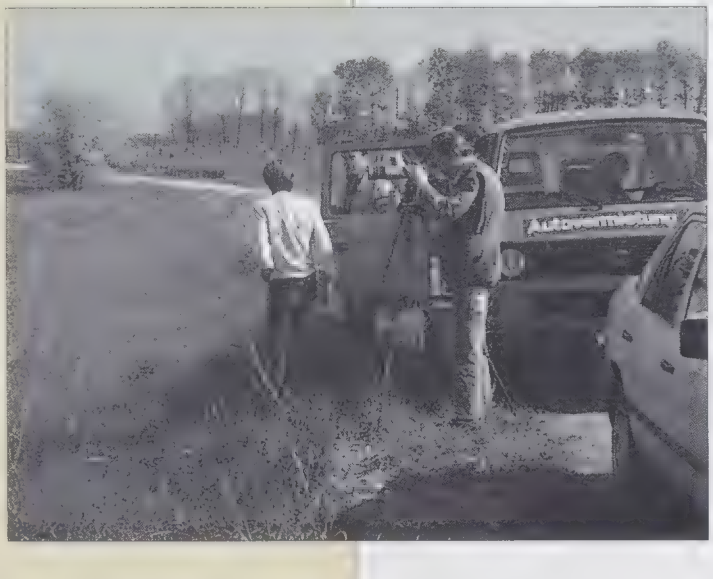
1. Who will lead the tour? Most companies are proud to announce who their leaders are, and with good reason—the leaders are expert, experienced, and popular. If a company plans and advertises a trip without determining beforehand who the leader will be, that's a bad sign.

2. Has the company done this tour before? Be wary of a trip that a company is running for the first time. Adventurous birders may choose to take such an exploratory tour anyway, but you should at least know what you are in for.

3. Know what is included in the tour price. Before you send in a nonrefundable deposit, know what your total cost will be. Are meals included in the tour price, or will you have to pay for them yourself? If the tour involves some internal flights, find out whether these are included in the listed price.

4. What is the pace of the tour? Most trips run by the major bird tour companies are moderately intense, with early starts and long days. But some tours are intentionally more relaxed. Conversely, other tours are marathon efforts to pursue every bird possible. Your own personal birding style will determine which kind is best for you. Any reputable company will provide an honest assessment of the pace or intensity of a particular tour.

5. What is the focus of the tour? Though most bird tours concentrate on birding, some have a broader focus, exploring other aspects of nature or local history and culture. Make sure you know the tour's focus before you go.



TIM GALLAGHER

The goal on a birding tour is to see lots of birds and have fun. The tour group above visits the famed puzta *of eastern Austria, home to the Great Bustard and other grassland species.*

Even with a well-established company, the first tour in a new area may be something to avoid. Logistical problems or lengthy delays may come up unexpectedly. And besides, on the very first trip to a new region, your fellow clients could turn out to be bored-and-boring listers who have been everywhere and are just looking to add a few more check marks to their life lists. If you wait for subsequent trips, the tour company should have the wrinkles ironed out of the itinerary, and the other tour participants should be genuinely interested in watching birds.

When comparing the prices of tours offered by different companies, be sure you know what is included in the advertised price. Some tours, for example, include meals in the cost of the trip, while others expect you to buy your food, which is fine—as long as you know in advance and take it into account as you make your price comparisons. Also find out whether airfare is included in the tour package price.

Differences in price among similar tours may also reflect the type of lodgings the company arranges. Some companies go for the least expensive, most basic hotels they can find to keep the price of their tours low, while others aim for more upscale accommodations. The ratio of participants to leaders can also affect the price; it may be worth paying a little more to be able to bird in a smaller group.

C. ALLAN MORGAN

A birding tour can be a great vacation for couples—but only if both people are keen birders. A nonbirding spouse who comes along on a tour may find that the days are long, the hotels are far from beaches or nightlife, and the birding sites include not only beautiful natural areas but also roadsides and garbage dumps. It can be a costly mistake to pay for a trip for two that will only be enjoyed by one. (As the wife of one birder said, "I don't know how he's going to afford the tour and alimony, too.") If you're inviting a nonbirder along on a birding tour, look for short trips at first, or consider taking a "compromise" tour that combines birding with other pursuits.

Doing your own research on tour possibilities

Finding out the dates and destinations of current tours is usually easy. If you're looking for a tour, you can be sure that the tour operators are looking for you. Most tour companies publish annual catalogs or more frequent newsletters describing their tour offerings in detail. You can obtain these by contacting the companies by telephone or mail. I've listed the addresses of some major tour companies in a sidebar to this article, but you can find many more companies advertised in most popular bird magazines. Write for tour catalogs from several companies to widen your choices and get a thorough idea of what is available. Of course, a written description can never provide a complete picture of what a tour will be like. Some further research on your part will definitely pay off.

Most tour companies—except for the smallest independents—maintain offices with regular business hours. If you're uncertain about any aspect of a tour, don't hesitate to call the staff. If you have asthma, for example, you may want to know the maximum elevation a tour will reach. If that information is not in the printed tour material, the company office should be able to find it out for you.

RICK & NORA BOWERS

If you're planning to take along a nonbirding spouse or friend, consider booking a tour that combines bird watching with sightseeing. Above, a group visits the picturesque and bird-rich Mayan ruins at Tikal, Guatemala. Far left, birders take a boat ride to a Magnificent Frigatebird roost at Boca de Soledad, Mexico.

The success of a birding tour depends largely on the skills of its leaders. And not just birding skills. The ability to handle logistics is vital, and "people skills" may be even more so. It's no fun to travel with a leader who has a rotten personality, no matter how well the person may know the birds. People who work for major tour companies are likely to be excellent leaders; they wouldn't last long otherwise. On the other hand, an independent leader who has started his or her own company could be wonderful or terrible. This is no reason to avoid the smaller companies, but you may want to do some extra research before signing up for a tour with one of them. One of the best ways to find out about particular companies or tour leaders is to talk to someone who has traveled with them.

Of course, no leader can deliver a perfect tour if the original itinerary is flawed. A savvy traveling birder will research a region and its birds to judge whether the planned itinerary is a good one. If you're a keen birder bent on visiting Kenya, for example, you may find out that many of the country's bird species are found only in the forests of western Kenya. Armed with that knowledge, you might pass up a tour that goes only to the game parks in central Kenya and look for a trip with a more bird-oriented route.

But there's another reason for researching a tour destination, and it is perhaps the most important reason of all: for the fun of it. After all, your enjoyment of a birding tour doesn't have to be limited to the time that you're actually on the trip. You can savor the possibilities of a birding tour for months beforehand. And if you've chosen wisely, warm memories of your trip can last a lifetime. ■

Kenn Kaufman is a renowned birder, tour leader, and author of A Field Guide to Advanced Birding.

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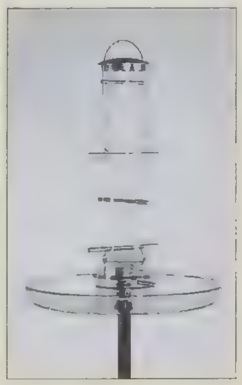

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Answers to the quiz on page 9

1. Northern Flicker, Lewis' Woodpecker, Red-headed Woodpecker. 2. Cattle Egret. 3. Green-winged Teal. 4. American Dipper. 5. Foliage browsers: Ruffed Grouse, Spruce Grouse, Willow Ptarmigan. Sweepers: Roseate Spoonbill, American Avocet. Diggers: Crissal Thrasher, Le Conte's Thrasher, California Thrasher. 6. Magnificent Frigatebird, Parasitic Jaeger, Pomarine Jaeger, Long-tailed Jaeger, Heermann's Gull, Laughing Gull, Common Black-headed Gull, Glaucous Gull, Mew Gull, Bald Eagle. (Great Skua and South Polar Skua also pirate, though they are not described in EDW since they do not nest in North America.)

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From the introduction by Arnold Small

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Birding by Mail

by Rick Bonney

Here's another activity to add to your list of bird-related hobbies

The first merit badge I earned as a Boy Scout, which will probably come as no surprise, was ornithology. (Except I think it was called bird study.) Now, three guesses—what was the second? It wasn't nature, or camping, or cooking, or even swimming or lifesaving—although I did earn all of those badges during my short scouting career. Nope, you're not even close. The second merit badge I earned, and the one that actually gave me the most pleasure, was stamp collecting.

I never lost my interest in birds, not even in high school, where my bird-watching escapades earned me the nickname "Ranger Rick" (which was not meant to be complimentary). The stamps, however, were banished to shoe boxes when my teenage sweetheart informed me that they were definitely not cool.

But just last year, after my wife's father passed away, I discovered his stamp collection in a closet. When I started sorting through it my childhood interest was rekindled. Soon thousands of bits of colored paper were again spread across my desk, and I'd become a collector once more. But not a general collector, as I had been in my youth. Nowadays, so many stamps have been issued that specialization has become imperative. My solution? I'm an ornithophilatelist.

I'm not alone; collectors of bird stamps are everywhere. According to surveys conducted by the American Topical Society—a group of people who collect stamps according to the topic pictured, for example, ships, trains, lighthouses—birds are consistently among the most popular subjects collected.

It's no wonder. Virtually every country issues stamps picturing birds, sometimes dozens in a year. To date, more than 10,000 different bird stamps have been printed, worldwide, depicting over 2,200 bird species. In fact, so many bird stamps are now available that many collectors further restrict their efforts to just a few species.

My own collection runs to stamps showing doves and woodpeckers. Why? Doves because of the Lab of Ornithology's Project PigeonWatch; I've found that collecting dove stamps has given me a global perspective on this fascinating family of birds. And I collect woodpeckers on stamps because I think they look nice.

Getting started in bird-stamp collecting is simpler than you might think. The easiest way is to buy a packet of stamps from a topical dealer, many of which are listed in *Topical Times*, the journal of the American

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Topical Association (P.O. Box 630, Johnstown, Pennsylvania 15907). One company, for example, regularly offers a packet of 500 different bird stamps for $16.00 postpaid.

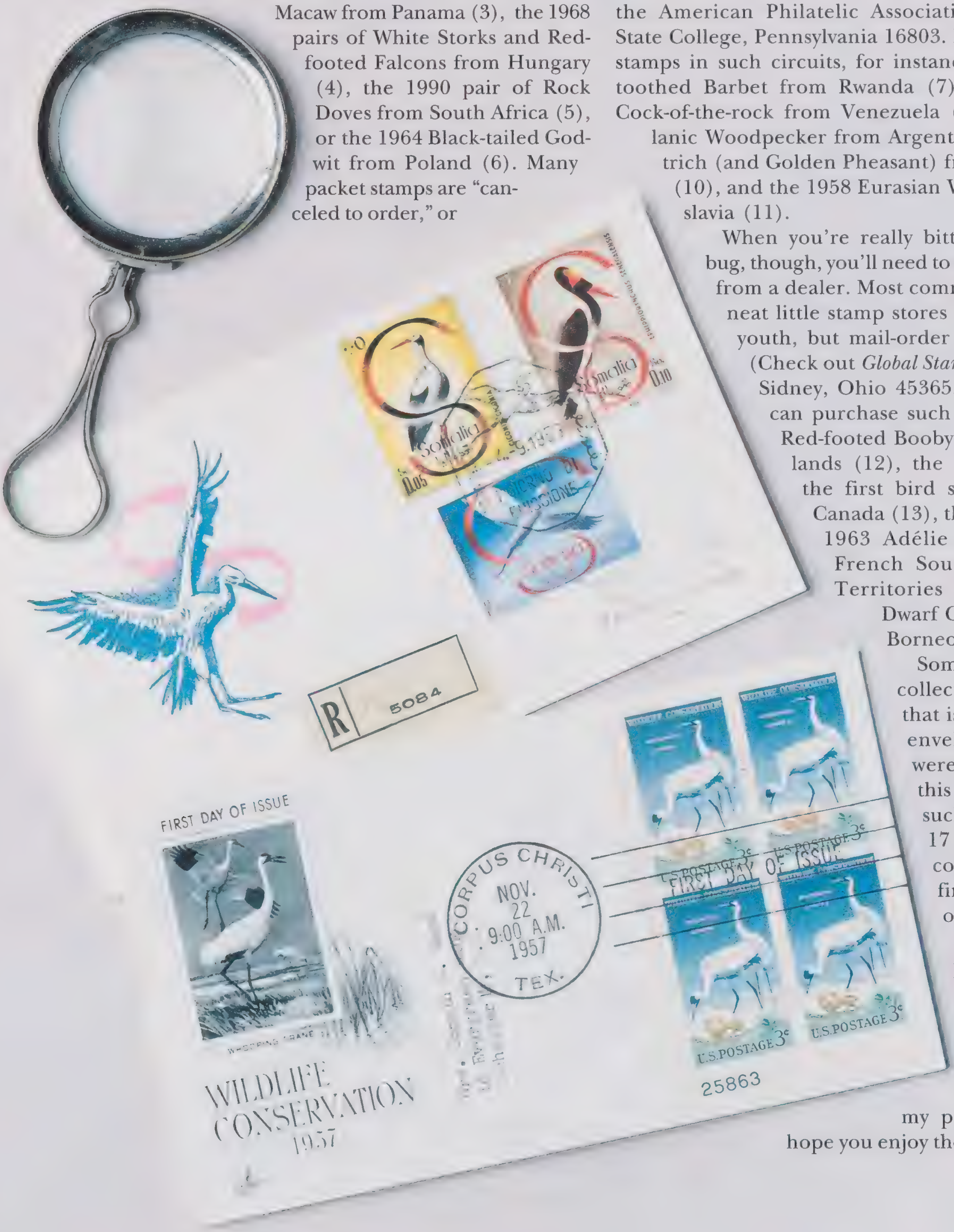
The stamps in such a packet will obviously be of the more common variety, for example, the 1956 Wild Turkey from the United States (1), the 1964 pair of Silver Gulls from New Zealand (2), the 1965 Scarlet Macaw from Panama (3), the 1968 pairs of White Storks and Red-footed Falcons from Hungary (4), the 1990 pair of Rock Doves from South Africa (5), or the 1964 Black-tailed Godwit from Poland (6). Many packet stamps are "canceled to order," or CTO, as illustrated by the Hungarian issues; such stamps were never intended for use on mail, and are intended solely for collectors. ("Pure" philatelists frown on collecting such stamps—I'm not above it myself.)

Once you've sorted out a packet, you can satisfy further collecting desires at relatively low cost by getting on a "sales circuit," which consists of books of stamps circulated through members of an organization, for example, the American Philatelic Association, P.O. Box 8000, State College, Pennsylvania 16803. I've seen lots of great stamps in such circuits, for instance, the 1967 Double-toothed Barbet from Rwanda (7), the 1961 Guianan Cock-of-the-rock from Venezuela (8), the 1960 Magellanic Woodpecker from Argentina (9), the 1968 Ostrich (and Golden Pheasant) from the Soviet Union (10), and the 1958 Eurasian Woodcock from Yugoslavia (11).

When you're really bitten by the collecting bug, though, you'll need to start puchasing stamps from a dealer. Most communities have lost the neat little stamp stores I remember from my youth, but mail-order dealers are thriving. (Check out *Global Stamp News,* P.O. Box 97, Sidney, Ohio 45365.) From a dealer you can purchase such beauties as the 1935 Red-footed Booby from the Cayman Islands (12), the 1946 Canada Goose, the first bird stamp ever issued in Canada (13), the 1959 skuas and the 1963 Adélie Penguins from the French Southern and Antarctic Territories (14), and the 1909 Dwarf Cassowary from North Borneo (15).

Some collectors prefer to collect stamps "on cover," that is, still attached to the envelope on which they were mailed. A subset of this is the first day cover—such as the one on page 17 and the two at left—a cover canceled on the first day the stamp was offered for sale.

The stamps on these pages are from the Lab of Ornithology's collection—which was given to Lab in 1968 by Mrs. Donald Wood—and also from my personal collection. I hope you enjoy them as much as I do. ■



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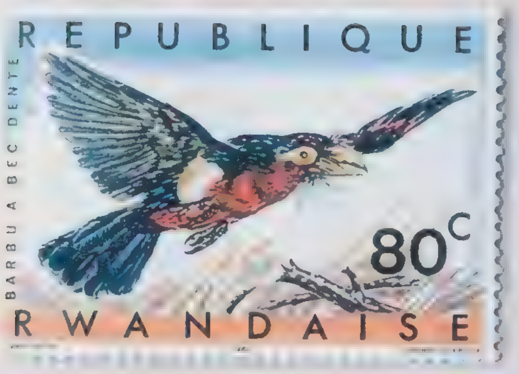
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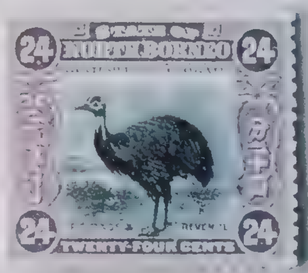
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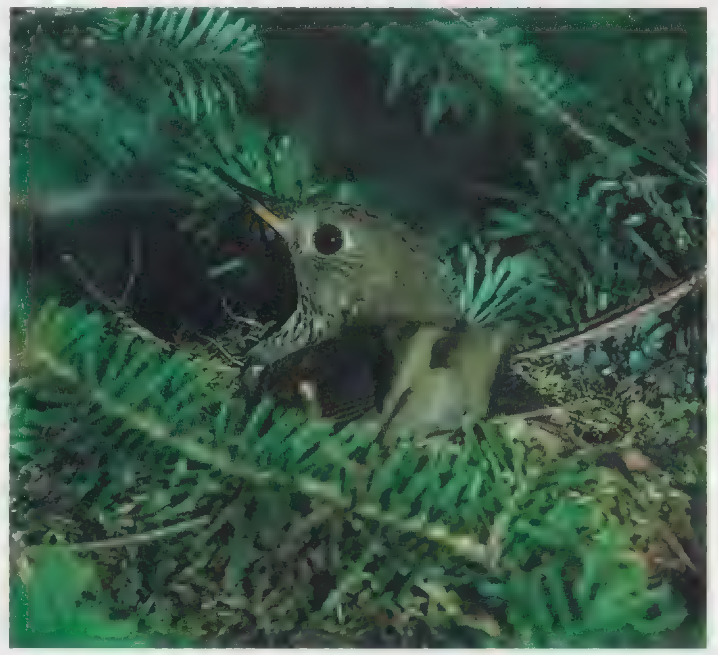
Cutting Through the Fog

Text and photographs by Steve Faccio

Is the Bicknell's Thrush headed for extinction? The answer is as foggy as its mountaintop home.

North American birders may soon have a new species to add to their life lists, and a new challenge—identifying it. This "new" bird is nearly impossible to distinguish from its closest relative unless you hear it sing on its mountaintop breeding grounds in the northeastern United States and Canada's Maritime Provinces. And until recently, its status (distribution and population size) was as foggy as its lofty mountain haunts. If declared an official species by the Check-list Committee of the American Ornithologists' Union (AOU), it will be the Northeast's only endemic songbird—the only bird that nests nowhere else. This neotropical migrant, which winters on a few Caribbean islands, may also rank as a potentially endangered species.



Since Eugene Bicknell discovered the bird in New York's Catskill Mountains in 1881, ornithologists have classified Bicknell's Thrush as a subspecies of the more widely distributed Gray-cheeked Thrush. Ornithologist George Wallace first reported distinct differences between the two races in his classic 1939 study. Bicknell's Thrushes were considerably smaller than gray-cheeks and had shorter wings. They were also, on average, a richer brown color than the olive-gray gray-cheeks, although both subspecies appear in both color forms, making visual identification in the field difficult. Wallace also reported that the two forms sang slightly different songs on their breeding grounds, which are separated by an area the size of Maine. These differences, although compelling to many ornithologists, were not at the time enough to warrant species status for Bicknell's Thrush.

Recent research by Canadian zoogeographer and taxonomist Henri Ouellet, however, indicates that the two races may indeed be distinct species. Although the differences between the birds' songs are subtle to human ears, when Ouellet played recordings of gray-cheek songs during the breeding season, Bicknell's Thrushes completely ignored them—indicating that the birds probably don't mix during mating season. These findings were supported by the work of Gilles Seutin, then a University of Montreal graduate student. Seutin used sophisticated analyses of mitochondrial DNA to reveal significant genetic differences between the subspecies. His study suggested that the two birds diverged from an ancestral population and have since evolved independently.

Is the Bicknell's Thrush, far left, a separate species? It is smaller and browner than the Gray-cheeked Thrush, with a distinctly different song. Above, Chris Rimmer, VINS director of research, rigs mist nets on Vermont's Haystack Mountain. It's part of the effort to determine the Bicknell's breeding population—essential baseline data for a bird that may be endangered.

In June of 1993 I saw my first Bicknell's Thrush. It was lying helpless but unhurt in a mist net near the summit of Mount Mansfield, Vermont, the site of Wallace's 1939 study. I was there as part of a research project developed by the Vermont Institute of Natural Science (VINS) and the Manomet Observatory (MO) to investigate the population status and distribution of the Bicknell's Thrush. Two ornithologists, Chris Rimmer and Jon Atwood, hatched the idea for the study in 1991 after they heard Ouellet and Seutin present their findings at the 109th annual meeting of the AOU. Rimmer and Atwood immediately realized that we know very little about this neotropical migrant—so little that if the entire population dwindled to dangerously low levels, it would probably go unnoticed. No baseline data on the thrush existed, and birders rarely visit its mountaintop habitat.

Rimmer, the director of research at VINS, and Atwood, a senior staff scientist at MO, wondered if populations of Bicknell's Thrush were already declining. They knew that essential habitat—both the spruce-fir forests where the birds nest and their restricted wintering habitat in the Caribbean—face a number of threats.

Historically, Bicknell's Thrush ranged from Nova Scotia, New Brunswick, and the Gaspé Peninsula in Canada, south through the mountains of northern New England and New York during the breeding season. Recently, the birds have disappeared from some nesting areas in the Canadian Maritimes, and in Massachusetts the subspecies has not nested on Mount Greylock, its only known breeding location in that state, since 1972.

Bicknell's Thrush nests almost exclusively in high-elevation forests, mostly above 3,000 feet, in the northeastern United States. These mountaintop forests, mostly red spruce and balsam fir, are like islands in a sea of unsuitable habitat. Since the mid-1960s red spruce stands in New Hampshire, Vermont, and New York have suffered severe diebacks that scientists attribute to acid pre-

BHL

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cipitation. Additional habitat loss to ski area development and transmission tower construction could further reduce this already restricted breeding range. Furthermore, northern coniferous ecosystems across North America could be drastically altered by global warming. Research indicates that a mean annual temperature increase of 2 degrees Centigrade would cause red spruces to be replaced by deciduous hardwood trees.

> *Their song is more under the breath than that of any other thrush, as if the bird was blowing in a delicate, slender, golden tube . . . like a musical whisper of great sweetness and power*

The winter home for Bicknell's Thrush appears to be limited to a few Caribbean islands, primarily Hispaniola (Haiti and the Dominican Republic) and Puerto Rico. Ecological studies on these islands indicate that Bicknell's Thrush probably inhabits only primary tropical forests, and these forests have been heavily clear-cut, burned, and otherwise converted to alternative uses that support burgeoning human populations. It seems certain that widespread deforestation throughout the Caribbean has adversely affected Bicknell's Thrush. How much is unclear.

In 1992 VINS and MO began to assess the conservation status of Bicknell's Thrush, to determine whether it deserves formal protection under federal or state endangered species laws. Rimmer and Atwood hoped to answer three basic questions: 1) Where are Bicknell's Thrushes currently found, and how does their present breeding distribution compare with historic information? 2) How large is the population and is it increasing or decreasing? 3) What are the most efficient methods for censusing the birds?

The researchers knew they would need a lot of help to answer the first question. The peaks where Bicknell's Thrush breeds are widely scattered throughout the five-state region, and they're usually accessible only on foot, often without even the "luxury" of trails.

They recruited an impressive group of 141 volunteer observers to help census peaks in New York, Vermont, New Hampshire, Massachusetts, and Maine. Grants from the National Fish and Wildlife Foundation and the U.S. Fish and Wildlife Service (USFWS), matched by funding from several private foundations, supported two field assistants who surveyed 71 peaks in Maine and two more who surveyed peaks in Vermont, New Hampshire, and New York. A number of VINS staff members, including Chris Rimmer and me, took time off from other projects to scale a few Bicknell's peaks.

To survey my three assigned peaks I set the alarm for 4:30 A.M. I was hiking on the Long Trail in Vermont's Green Mountain National Forest by 5:30. Twenty minutes later I reached the stream crossing I had marked on the topographic map, checked my compass, and headed off the trail and uphill. By 6:30 the sugar maples and white ash trees yielded to red spruce and balsam fir, and the Black-throated Blue Warblers and Scarlet Tanagers gave way to Blackpoll Warblers and Dark-eyed Juncos.

I was at the 3,000-foot summit of an unnamed peak. I sat down next to a pile of moose scat to catch my breath and unpack the contents of my day pack: binoculars, clipboard with survey instructions and data sheets, and portable tape player loaded with a recording of Bicknell's Thrush songs and calls from the Cornell Lab of Ornithology's Library of Natural Sounds (LNS).

Before playing the tape, I waited a few minutes, listening. Winter Wren, Yellow-rumped Warbler, White-throated Sparrow, and a buzzing horde of mosquitoes announced their presence; Bicknell's Thrush did not. I pushed a button on my tape deck to broadcast a spiraling, reedy song through the conifers. Moments later a bird responded.

First I heard a distinct, nasal call note, *wheere,* then a male Bicknell's Thrush in full song. His voice had the musical quality of all *Catharus* thrushes, something like a Veery but thinner and more subtle. The brief song tumbled down the scale, then rose sharply at the end. The bird sang for less than a minute, then silently vanished, leaving me without so much as a glimpse. It was a typical Bicknell's encounter—brief, mysterious, enticing. Perhaps at the next survey site I'd get a look at this secretive thrush.

The LNS recordings are essential for accurately and efficiently determining the presence or absence of Bicknell's on small, isolated mountain peaks with limited habitat and few thrushes. The birds are most responsive to the taped songs and calls during June and early July, the period of highest vocal activity and territoriality. So with the tapes an observer can quickly complete a survey and move to another site to repeat the process.

My next stop was Mount Mansfield. As I drove west out of Stowe, Vermont, on a calm June morning the summit was lit by a rising sun, though no other place in the state was in sunshine. A ring of fog circled the lower half of the mountain like a lacy veil, above which a broad ridge line formed the profile of a reclining face. To the left, still in shadow, was the "Forehead," to the right, bathed in warm light, the "Chin," which at 4,393 feet is Vermont's highest point. I turned onto the Mansfield toll road.

This was my first visit to Mount Mansfield and I was anxious to reach the summit. When I finally arrived at a parking area just below the "Nose," the mountain had raised its veil and the summit was shrouded in a dense fog. Finding my colleague Chris Rimmer, who had arrived the day before, would be difficult.

Chris and Jon Atwood set up a study plot on Mansfield in 1992 to investigate the population density and breeding ecology of Bicknell's Thrush. At an elevation of 3,800 to 3,900 feet, the plot encompasses about 22 acres of *krumholtz*, the stunted, wind-shaped trees that grow just below treeline. Several trails wind their way through the dense vegetation, which is dominated by balsam fir, red spruce, and dwarf birch. On one of these trails I finally found Chris removing a White-throated Sparrow from a mist net. "Where are the donuts, Doc?" he greeted me, then added, "It's going to be tough to see color-bands in this fog."

Chris knows the study site intimately, having spent many hours conducting point-counts, doing line transects, and spot-mapping Bicknell's Thrush territories to estimate their population density. As we took down a mist net to move it to a different location, Chris explained that, based on his 1992 field work, he estimated between 40 and 55 pairs occupied each 100 acres of suitable habitat on Mansfield. Now he was trying to color-band as many birds as possible, to get a better understanding of their demographics and breeding ecology. But catching the secretive thrushes has been more difficult than he expected. During the seven hours that I spent with Chris, we caught just one Bicknell's Thrush.

The dense vegetation and steep terrain at the study site limit where mist nets can be set up. Hiking trails, the toll road, or bare rock are the only suitable locations. And since the trees are only 6 to 8 feet tall, birds can see and avoid the nets much more easily than they do in the shady understory of low-elevation forests. To keep the birds guessing, Chris moves the nets frequently, and to increase the chances of catching birds, he often takes a more active approach, placing a carved, wooden thrush decoy near the net and broadcasting a tape recording of Bicknell's songs and calls to attract territorial birds. In one of these "active" nets we caught our Bicknell's—the first I'd ever seen.

The bird was a rich chocolate color, browner than the Swainson's Thrush we had caught earlier, and lacked the buffy eye ring of that species. We fitted it with an aluminum USFWS band and a unique combination of three plastic, colored leg bands that would permanently identify it. Chris measured its wing length, checked its breeding condition, stage of molt, and amount of body fat, and placed it in a nylon stocking to be weighed as I recorded the information on a data sheet.

After 10 minutes we released the bird, and it disappeared into the maze of branches. Chris and I moved the mist net to a new location and began work on another phase of the breeding ecology study—finding nests. Periodic nest monitoring helps to determine how the birds use their habitat and how successfully they are reproducing.

Describing his field work on the Bicknell's Thrush almost 60 years ago, George Wallace wrote, "Only a freak ornithologist would think of leaving the trails for more than a few feet. The discouragingly dense tangles in which Bicknell's Thrushes dwell have kept their habits long wrapped in mystery." I now have a firsthand appreciation of this declaration. You don't truly experience the *krumholtz* until you venture off the trails. I used a combination of techniques, including blindly forcing my way through densely interwoven stands of spruce, belly-crawling underneath the trees, and stumbling over logs, rocks, and unseen tree limbs. More than an hour later I emerged, scraped and sweaty, without having found a single nest.

Although mist netting and nest searching are labor intensive and time consuming, Rimmer and Atwood have made progress in understanding this secretive bird's population and conservation status. After two years of field work, survey results show that Bicknell's Thrushes are surprisingly widespread. They were present on 230 of the 332 peaks surveyed in New York and New England in 1992 and 1993. Population estimates ranged from one or two pairs on about 80 peaks to more than 200 pairs on Vermont's Mount Mansfield.

BAUSCH & LOMB

A rare encounter between bird and biologist. Chris Rimmer, above, and a crew of more than 140 volunteers scaled dozens of northeast peaks in search of the Bicknell's Thrush, which breeds in impenetrable mountaintop tangles.

Although the bird's distribution doesn't seem to have changed significantly compared to historic reports, important questions remain about population size and sta-

BRIAN PATTESON

If the able captain can maneuver close, the bird that was once a bland depiction in a field guide becomes real and unforgettable

CALLS IN THE NIGHT

Although many people don't know it, most North American songbirds migrate at night. Not only that, but the birds vocalize while they're flying. My overwhelming fascination with these nocturnal flight calls unwittingly led me to discover the night call of the Bicknell's Thrush.

In the spring of 1989 I was on the east coast of Florida, near Cape Canaveral, listening to the night flights overhead and trying to identify the birds giving each different call. Recognizing birds such as Canada Geese when they pass over at night is easy. But unlike geese, which make the same *honk* night and day, songbirds make nighttime calls that are often very different from their daytime calls. Because the birds are flying under cover of darkness, learning the identity of the caller can be quite difficult.

One of my strategies for matching nocturnal flight calls with the birds that make them is to record and compare calls from different geographic regions. The Bobolink, for example, is a common migrant in Florida but rare in south-coastal Texas, and the Dickcissel is a common migrant in south-coastal Texas but rare in Florida.

My recordings of nocturnal flight calls reflect this migration geography. I've recorded thousands of the Bobolink *pink* notes in Florida, but none in Texas. In Texas, the low, burry-sounding *bzrrrt* of the Dickcissel is one of the commonest nocturnal flight calls, but I've never recorded it in Florida.

My encounter with Bicknell's Thrush came as I was listening to tapes from the last night of my 1989 Florida recording trip. Amid the thousands of songbird calls on those tapes, two isolated calls stood out. They sounded like the calls of the Gray-cheeked Thrush, but they had a different quality. I knew that thrush calls were variable, though, and my curiosity was soon distracted by other intriguing questions.

Two years later, in the spring of 1991, I returned to Florida. During a spectacular mid-May nocturnal flight along the coast, I recorded about 20 more of the unique-sounding calls.

What *were* they? Because of the location, the season, and their similarity to Gray-cheeked Thrush calls, I thought they might belong to Bicknell's Thrush. Ornithologists have collected three specimens of Bicknell's Thrush in eastern Florida during spring migration, so it seemed likely that the bird migrates through the state, especially considering that it winters on some mountainous islands in the Caribbean.

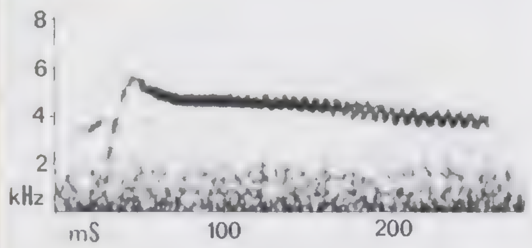
To verify my tentative identification, I returned to the Cornell Laboratory of Ornithology and asked for some recordings of the species from the Library of Natural Sounds. I wanted to compare my mystery night calls to the daytime calls of Gray-cheeked and Bicknell's Thrushes. The recordings I used had been made by Lab co-founders Arthur A. Allen and Peter Paul Kellogg back in the early 1950s, on the birds' breeding grounds.

I used the computer software program "Canary" (developed by the Lab's Bioacoustics Research Program) to make spectrographs of the daytime calls and my night calls. When I compared them, I found that my nocturnal calls had characteristics similar to the diurnal calls of the Bicknell's Thrush. They were about a kilohertz higher than those of the Gray-cheeked Thrush; the spectrographs were also less arched and sloped downward more uniformly.

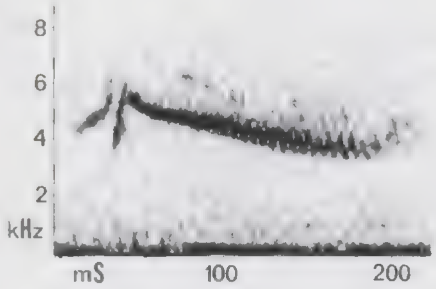
In the spring of 1993 I returned to Florida and recorded about a dozen more nocturnal flight calls that matched the ones I had identified as Bicknell's Thrush. Recent estimates put the Bicknell's population at more than 5,000 individuals, so the number of birds I detected in Florida seems surprisingly small.

Why did I record so few birds? Do most of the birds migrate through Florida later in May? Or do most birds bypass Florida and migrate over the Atlantic, making landfall in the Carolinas?

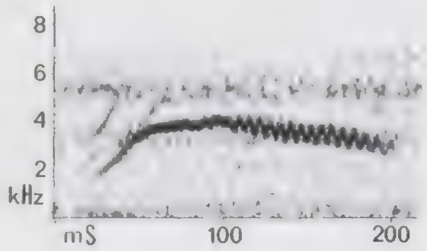
The technique of identifying birds by their nocturnal flight calls is still under development. Perhaps in the near future we can use it to answer these questions, and even to monitor the populations of species such as the Bicknell's Thrush.



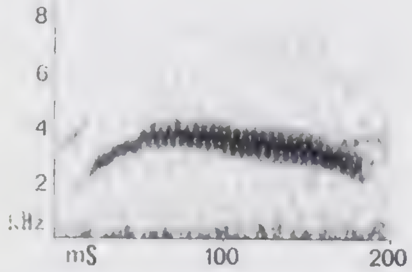
Bicknell's Thrush nocturnal call



Bicknell's Thrush daytime call



Gray-cheeked Thrush nocturnal call



Gray-cheeked Thrush daytime call

Bill Evans's mystery night call, top, looked more like the daytime call of the Bicknell's Thrush than either of the Gray-cheeked Thrush calls.

—*Bill Evans*

Bill Evans is a research associate at the Cornell Laboratory of Ornithology.

Further Reading

Evans, William R. Nocturnal flight call of Bicknell's Thrush. *The Wilson Bulletin*, vol. 106, pp. 55-61; 1994.

BIRD FEEDING BASICS

by Sheila Buff

From seed types to squirrel defenses, everything you'll need to know to attract birds to your yard

When we moved into our house in the Hudson Valley, friends gave us a wooden bird feeder as a housewarming gift. Eager to begin the rituals of country living, I promptly filled the feeder with a bag of mixed seeds from the supermarket and hung it with stout string from a tree branch near the house. Within an hour, the backyard birds had discovered the feeder and were flocking to it with gratifying eagerness. Within two hours, a squirrel, obviously experienced in these matters, bit through the string and sent the feeder crashing to the ground. As I stood contemplating the wreckage, an adorable little Black-capped Chickadee darted down to the splintered feeder, snatched a sunflower seed, and flew directly into a closed window. Clearly, there was more to this bird feeding business than I'd thought.

Flocks of colorful feeder visitors such as the American Goldfinches at left are everyone's backyard dream-come-true. Read on for tips on making your own bird-feeding station irresistible to birds—and safe from marauding squirrels.

MASLOWSKI WILDLIFE PRODUCTIONS

Not too much more, as it turns out. After feeding birds for seven years and writing two books on the subject, I've learned that to be successful you must do three basic things: offer appropriate foods, select sturdy feeders, and try to keep the squirrels away.

WHAT TO FEED THE BIRDS

The birds that are most likely to come to your feeder are the ones that eat seeds, so seeds are what you should offer. But what kind? Scientific studies such as the Cornell Lab of Ornithology's Seed Preference Test and empirical evidence alike show that most birds have two clear favorites: black-oil sunflower seeds and white proso millet.

RICHARD DAY/DAYBREAK IMAGERY

Sturdy plastic tube feeders like this one are durable and easy to clean. The black-oil sunflower seed inside is a good all-purpose food—most feeder birds like it, and the price is right.

Large birds, small birds, and birds in between love black-oil sunflower seeds. They have a high meat-to-shell ratio; they're nutritious and high in fat, which birds need; they have thin shells that are easy to crack; their small size makes them easy to manipulate in the bill; and they're inexpensive. Black-oil sunflower seeds are particularly attractive to chickadees, cardinals, nuthatches, siskins, redpolls, titmice, finches, crossbills, small woodpeckers, and grosbeaks. Indeed, a wandering flock of about 30 Evening Grosbeaks once emptied the sunflower seeds from my gallon-sized feeder in the course of a single winter afternoon.

White proso millet is what most people envision when they think of birdseed. This small, round seed is the major ingredient in most commercial seed mixes for pet parakeets and canaries. The volunteer-based Seed Preference Test provided evidence that millet is a good seed for attracting small, ground-feeding birds such as doves, juncos, and sparrows and larger ground-feeders such as Bobwhites and Mallards. Most of the birds that like sunflower seeds will also eat white proso millet, although with less enthusiasm.

Corn is another bird favorite and perhaps the least expensive of all bird feeds. Larger birds such as jays, ducks, geese, quail, and turkeys eat whole or coarsely cracked grains; finely cracked corn (also called chick corn) attracts smaller, ground-feeding birds such as cardinals, towhees, juncos, doves, and assorted sparrows. Be sure your feeder is weatherproof when you offer corn. In a leaky feeder, finely cracked corn absorbs water and turns into a sticky, moldy blob.

Thistle seeds (also called niger) magically attract some of the most colorful backyard birds, including American Goldfinches and Indigo Buntings. Even better, squirrels and larger birds usually aren't very interested in these tiny black seeds. But thistle is expensive—nearly twice the price of black-oil sunflower seed. To avoid waste, offer it only in a special thistle tube feeder with tiny feeding ports.

The commercial seed mixes you can buy in feed stores, garden centers, and similar outlets usually combine sunflower seeds and white proso millet with other seeds such as wheat, red millet, oats, peanut hearts, corn, canary seed, rice, and red milo (also known as grain sorghum). Some mixtures even contain bits of fruits and berries. The manufacturers formulate these mixtures for a particular season or to attract a particular type of bird—finches, for example.

Many commercial mixtures are no bargain. The filler seeds, which have little appeal to backyard birds, may make up half or more of the mixture, and mixtures often cost a bit more than the equivalent amount of plain black-oil sunflower seed. Red milo, which is very inexpensive, is often a main ingredient in mixes, especially the cheaper ones commonly sold in grocery stores (you can detect it by its reddish color). According to Seed Preference Test data, milo is popular with some bird species, especially in the Southwest, but often birds will pick through the mixture to find the sunflower seeds and white proso millet and flick the filler onto the ground. Ground-feeding birds do eat some of the discarded seeds, but the rest will rot or attract unwanted rodents.

Why pay for wasted food? If you want to offer an attractive and low-cost seed mixture, mix it up yourself. I like to pour one 25-pound sack of black-oil sunflower seed, one 10-pound sack of white proso millet, and one 10-pound sack of coarsely cracked corn into a 33-gallon plastic trash barrel. I use a broomstick to mix the seeds together. The mixture fills the barrel about two-thirds full. Be sure to replace the lid tightly. I once forgot to do this and the next time I opened the barrel I found a mouse sitting on the pile, calmly munching seeds.

Insect-eating birds such as woodpeckers, titmice, chickadees, and nuthatches all take seeds from the feeder, but you can also attract them with suet. Suet is beef fat, generally but not always from around the kidneys. You can usually buy it for under a dollar a pound at your supermarket meat counter (sometimes free to good customers), or buy ready-to-use cakes at a feed center.

Hang the raw suet from a tree in a mesh bag or a suet basket made of vinyl-coated wire. Perhaps because we humans don't like the idea of eating raw fat, many people make their own cakes of suet mixed with cornmeal, peanut butter, and a variety of seeds, nuts, and fruits. These cakes don't really attract the birds any better than plain suet does, but they do attract squirrels and raccoons.

Suet is usually thought of as a cold-weather food, but you can offer it throughout the year. It goes rancid quickly in the summer heat, though, so put out small amounts. Some people even take down their suet feeders at night and store them in the refrigerator.

TYPES OF FEEDERS

Most garden centers and nature stores offer a wide range of bird feeders. Look closer, however, and you'll see that many feeders are poorly designed or made of materials that won't hold up well.

First, design. The ideal feeder is sturdy and can withstand cold, wet winter weather. It has a fairly large capacity—at least two quarts—so that you don't have to refill it constantly. It's easy to assemble, put up, fill, and maintain (if it's a hanging feeder, be sure the hanging ring is securely attached). The feeder absolutely must keep the seed dry. It should be squirrel-resistant (more on that later). Most importantly, it should be safe. Too many bird feeders, including some very popular models, have poorly designed feeding ports that let birds stick their heads in, or even enter the feeder, especially when the seed level is low. The birds may be injured or killed trying to get out.

Next, materials. My rule is simple: Avoid wood, unless you find the feeder particularly attractive from an aesthetic standpoint. Feeders made from wood are easy targets for squirrel attacks. In addition, the rough surface can be a breeding ground for microorganisms that cause disease. If you keep your wooden feeder clean and don't get too emotionally attached to it, you should be able to enjoy it for at least a few months. Feeders made of metal or tough polycarbonate plastic are sturdy, far less vulnerable to attack, and much easier to keep clean.

Feeder design and materials come together

BIRD FEEDERS I HAVE KNOWN

Feeding birds can be as simple as tossing stale bread out your back door or as involved as providing a range of different feeders for every type of food and bird. For good, all-purpose backyard feeding, I recommend the feeders below.

One dome feeder stands out for its solid construction, attractive appearance, and effective squirrel resistance: the hanging **Droll Yankees Big Top** ($51.00). The Big Top holds nearly a gallon of seed, is made of heavy plastic, and accommodates both clinging and perching birds. The dome-shaped baffle keeps off the squirrels and protects the seeds from the elements. An additional baffle protects the vulnerable point where the hanging chain attaches to the feeder. You should easily get five years or more of excellent service from this feeder. A smaller version of the Big Top, the **Droll Yankees Seed Saver** (a bargain at $19.50), has the same features but holds less than a quart.

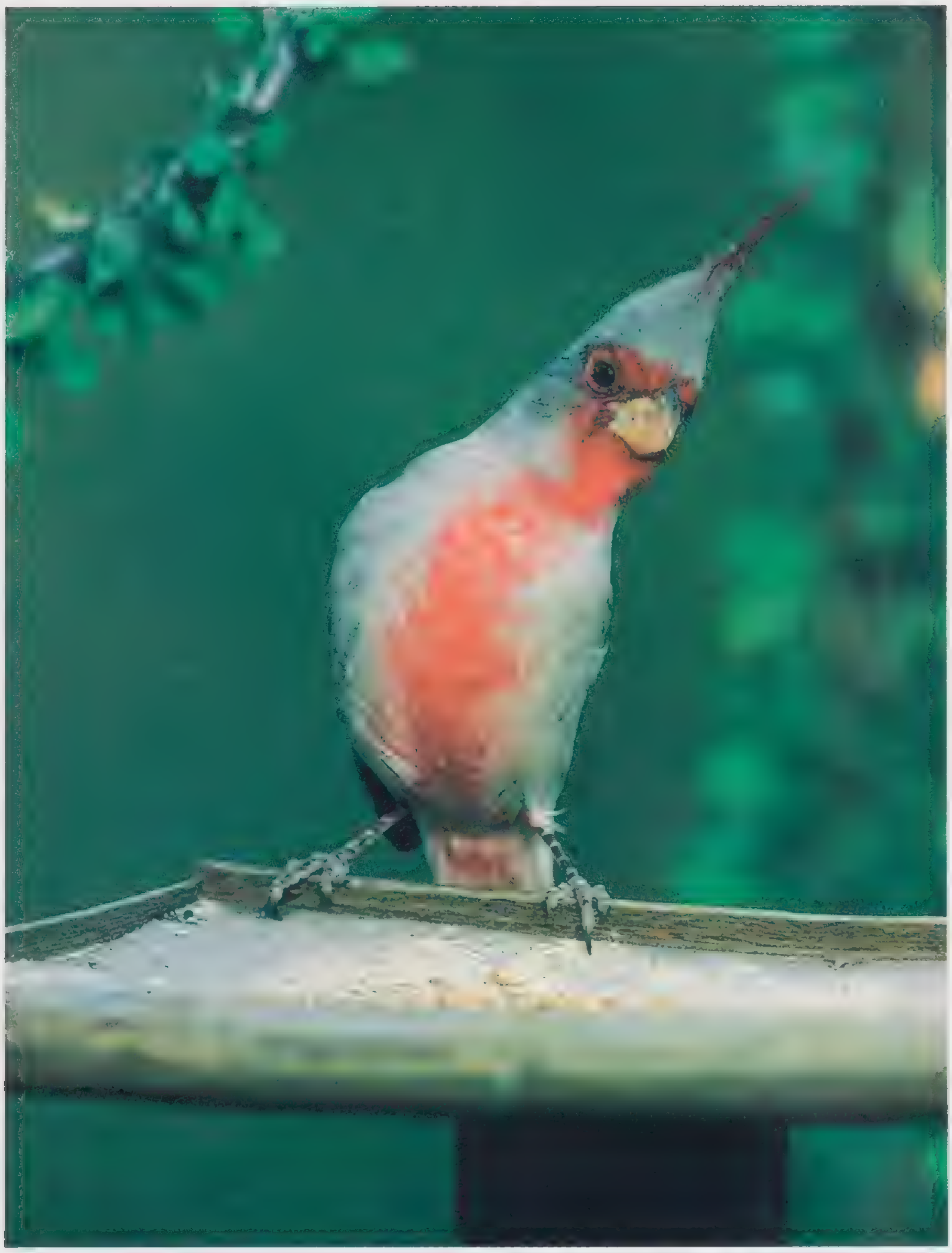
TIM GALLAGHER (2)

The plastic dome on the Droll Yankees Big Top feeder, above, protects the seed from rain and snow, keeps squirrels out, too. At left, here's another type of squirrel baffle, installed over a tube feeder. Note the metal fittings on the feeder—impervious to gnawing teeth.

One of the best tube feeders is the **Aspects Twin Tube** ($29.95). Two sturdy tube feeders from Droll Yankees are also very good: the imaginatively named **A-6** and **B-7** models. The A-6 ($26.00) holds only a quart; the larger B-7 ($48.00) holds twice as much. Other excellent tube feeders are the **Hyde Super Silo** ($43.95) and the **Audubon Triple Tube** (expensive at $65.00, but worth it for the extra-large capacity). All have good design, solid construction, and metal fittings. Any of these durable feeders would be a good choice.

I have had excellent luck with the hanging version of the counterweighted **Absolute Squirrel-Proof Feeder**, made by Heritage Farms—the squirrels haven't even chewed the wooden perch bar yet. This very sturdy feeder is made of heavy-gauge steel and holds 2 1/2 gallons of seed. At $65.00 it is expensive, but mine has lasted for more than five years and is still going strong. One minor drawback is that the wooden perch needs to be cleaned frequently. Another drawback is that this feeder is heavy even when empty. Either mount it on a post or hang it from a large branch with a strong chain or heavy hook.

C. ALLAN MORGAN



A Pyrrhuloxia checks out the dinner menu at a platform feeder. This simple feeder is attractive to ground feeding birds, but keep the platform clean to avoid spreading disease.

well in only a relative handful of styles (see the sidebar for some specific recommendations). Tube feeders are an excellent choice. They're made of heavy plastic with metal-reinforced feeding holes, perches, and caps, and come in a range of sizes. One advantage is that the larger birds some people consider undesirable, such as jays, can't fit onto the perches; many tube feeders are made with removable perches or none at all, so that only small, clinging birds can feed. Tube feeders often come with an attached seed tray to catch dropped seed and hulls. Although a tray does make it easier to clean up around the feeder, the hulls tend to block the drainage holes, leading to a smelly, moldy mess. In addition, squirrels and large birds find the tray a convenient perch. The major drawback to tube feeders is that the filler caps—even metal ones with clever attachment devices—are vulnerable to squirrel attack. Once a squirrel figures out how to get the cap off, the feeder is doomed.

Dome feeders are another excellent choice. The clear plastic dome over the seed bin deters squirrels, protects the seeds from the elements, and excludes larger birds.

For sturdiness, capacity, and pest deterrence—but not aesthetics—my personal choice is a counterweighted feeder. These hopper-style feeders are made of metal with an adjustable, counterweighted perching bar. When squirrels or heavy birds such as crows sit on the perch, their weight brings down a shutter that seals off the seeds.

Bubble feeders—ball-shaped hanging feeders designed for small birds—are cute and effective but don't hold much seed.

For sheer enjoyment, window feeders are great. Most are quite inexpensive and simple to install—they attach to the glass with suction cups. They don't hold much seed and are defenseless against squirrels, but you do get a marvelous close-up look at the birds. One morning last winter, I glanced out at the hopper feeder in the yard and saw what I thought was the usual mob of House and Purple Finches. But when I watched the birds up close at the window feeder in the kitchen, I realized that some were actually Red Crossbills—a first for my backyard.

KEEPING IT CLEAN

When birds crowd together at bird feeders, the risk of spreading disease increases. Bird droppings can contain parasites and infectious microbes; moldy seeds can also cause disease. To help keep the birds healthy, keep the feeder clean and the seed dry. Rake up spilled seeds and hulls under the feeder. If you notice dead or obviously ill birds near the feeder, stop feeding at once. Discard the seeds in the feeder, clean up around the area, and wash all parts of the feeder thoroughly, even the hanging chain, with a diluted bleach solution—one part bleach to nine parts water. Wait a few days before you put the feeder up again.

THE RIGHT FEEDER IN THE RIGHT PLACE

The real reason we feed birds is that we like to watch them. So when you're deciding where to put your feeder, place it where you can see it, and at a height that makes it easy to refill. One of my feeders hangs at a convenient height in the summer, when the leaves weigh the branch down; but when the leafless branch rises up in the winter, I either have to move the feeder or haul a step stool through the snow. Nature teaches us to be efficient in expending resources: I move the feeder.

To attract birds, place the feeder about 10 feet from natural shelter—trees, hedges, shrubs, or bushes. This gives the birds a protected place to perch while they await their turn at the feeder. It also provides a place to hide from predators such as hawks or cats.

The birds should spot your new feeder within a few days. If they don't, or if only a few birds come, try sprinkling some seeds on the ground around the feeder. Often, however, the solution is to move the feeder—it may be too exposed. If you notice that the seed in the feeder is getting blown out or wet, move it to a more sheltered spot. If the birds must cross a large, open area to reach the feeder, move it closer to a tree or shrub; sometimes a difference of just a few feet is all that's needed. You could also plant some greenery near the feeder, or better yet, add a brush pile (a loose heap of branches). I was amazed at the difference this made at my feeders, even though my yard was already full of natural vegetation. The number of birds seemed to double overnight.

AVOIDING WINDOW STRIKES

The awful thump of a bird crashing into your window is a sound you don't want to hear. One major cause of window strikes is reflections. A bird sees backyard greenery reflected in the window and thinks it is flying into open space, only to be brought up short by the glass. Sometimes windows on parallel sides of the house create a "show-through"; the bird thinks it has a clear passage. And sometimes territorial birds spot their own reflections in a window and try to chase away the "intruder." A male cardinal used to furiously chase a "rival" from a window in my study every morning around 10 o'clock. As he rounded the corner, his reflection disappeared and the bird flew off, convinced he had ousted the intruder.

Fortunately, window strikes are easy to prevent. Try moving the feeder a bit, so that birds approach and leave it from a different direction. Or place something in the window—wind chimes, house plants, commercially available hawk silhouettes—to break up the reflections. If territorial birds are a problem, try exterior window boxes to cut down on reflections. (A window box full of blooming red geraniums convinced my cardinal he had won for good.) Stop show-throughs by closing the curtains or shades on one of the windows. When nothing else works, some people hang netting (the kind that's sold for protecting fruit trees) in front of the window. The birds still hit, but at least they don't get hurt.

SQUIRREL-PROOFING YOUR FEEDER

The most important thing to remember about squirrel-proofing a bird feeder is that you can't. No matter how ingenious the device, no matter how vigilant your squirrel patrols, no determined squirrel can be kept off forever—and squirrels are *very* determined. But with a combined strategy of baffles, resistant feeders, and diversion feeding, you can keep damage to feeders and loss of seed to a minimum.

Sliding, tilting, or bowl-shaped baffles placed above and below the feeder deter squirrels climbing up the pole or down the chain, but not squirrels jumping on from the side. Squirrels can jump astonishing distances from a standing start, so position the feeder at least 5 feet off the ground and at least 10 feet from launching points such as tree trunks, decks, porches, window sills, and eaves. This arrangement is hard to accomplish in the average backyard. Also remember that squirrels overcome obstacles by eating them—be sure your baffles are made of metal or very tough plastic.

Even if you select one of the few genuinely squirrel-resistant feeders listed in the sidebar, pesky squirrels will keep hanging around the feeder. You can chase them off by yelling or letting the dogs out, but they'll be back in moments. Our squirrels give our dogs a sporting 15 yards before bothering to run.

Try diversion feeding: offer the squirrels whole corn kernels (loose or on the cob) in their own feeder, as far away from the bird feeder as possible. Our squirrels were quick to realize that an easy hand-out was a better deal than gnawing through plastic baffles to get sunflower seeds. Although they still mount an occasional raid on the bird feeders just to keep in practice, for the most part they stay away. For me, diversion feeding is proof again that harmony is nature's way. ■

Sheila Buff is the author of The Birdfeeder's Handbook *and* Birding for Beginners. *She lives in Milan, New York.*

"Oh boy, lunch!" This flimsy, unbaffled, string-supported feeder won't last long. Squirrels are agile and persistent, so mount your feeders far from squirrel launching points—and try distracting the rodents with some food of their own.

RIGHT: HELEN LONGEST-SLAUGHTER, NATURE IMAGES, INC.

Profile

THE ART OF SCIENCE

by Cynthia Berger

Ornithologist John O'Neill discovers birds; then he paints their portraits

When John O'Neill talks about what he hopes will be his twenty-seventh expedition to Peru, his eyes light up behind his wire-rimmed glasses and his soft, Texas drawl speeds up a bit. "Let me show you," he says, rummaging in a corner of his comfortably cluttered Baton Rouge, Louisiana, living room. He extracts an enormous, rolled-up map, the classroom kind that goes up and down like a window shade. Pushing aside piles of books, he kneels, shakes out the map on the floor, weights the curled edge with a copy of *The Pelican Brief*, peers at the fine print, and runs his finger lovingly along the blue lines that lead to discovery.

Peru's 1,708 bird species have been the focus of O'Neill's life since he visited the country as a college freshman in 1961. In 26 expeditions O'Neill, now 52, has discovered 12 new species—more than any other living ornithologist. His contribution to knowledge of the distribution and taxonomy of South American birds is vast. Writer Don Stap, who describes an O'Neill expedition in his recent book, *A Parrot Without a Name*, says, "It is virtually impossible to find a major paper of the last 15 years on neotropical ornithology that does not have a reference to O'Neill."

John O'Neill doesn't just discover birds, however. He also paints their portraits, with a scientist's precision and an artist's inspired vision. Roger Tory Peterson has said, "The fact that John is so equally talented means he must make a decision on what he wants to do—spend time painting or working on biology."

Since 1987 the former director of the Louisiana State University (LSU) Museum of Natural Science has decided to spend most of his time painting. His work appears in books, journals, magazines, and museums such as the Leigh Yawkey Woodson, known for its exhibits of bird art. It's also in best-selling field guides such as the National Geographic Society's *Field Guide to the Birds of North America* and the National Audubon Society's *Master Guide to Birding.* "I feel a debt to ornithology to do the field guides," he says.

A few paces from the unrolled map, a hall leads to the converted bedroom that is O'Neill's studio, its worktable cluttered with squeezed-up paint tubes. Earlier in the visit O'Neill rifled through the portfolios stacked against the walls, showing off some of his current projects: "Here's a Gambel's Quail, for a book I'm doing on Texas birds—I'm originally from Texas—oh, this is an *Archaeopteryx*; I did that for *The Age of Birds*, a book on ancient birdlife by Alan Fedducia. He was an LSU undergraduate and went on some of the Peru trips. Somewhere here I have stuff I'm doing for a new North American field guide—it's being published by Simon and Schuster for the National Wildlife Federation—and here's a fun one, a commissioned portrait of a pet Yellow-headed Parrot that belonged to a friend."

Another project is *Birds of Peru*, a major monograph covering all 1,708 species. It's the culmination of 25 years of fieldwork by O'Neill and the late Ted Parker, as well as dozens of other LSU staff and associates. O'Neill has already completed some of the plates (artist Larry McQueen is working on the others); now he's focusing on the species descriptions and seeking funding to finish this monumental work.

Yet on top of these commitments, O'Neill is submitting a proposal to the National Geographic Society for another Peruvian expedition. "I can't be full-time art, and I can't be full-time science, because I like 'em both," he says. "So I keep doing both." Later he will add, "My age is advancing. I'd better start getting into the field a *lot.*"

Now he finds the place he's looking for on the map. "These mountains, the Cordillera Azul, lie between two of the largest rivers in the country, in a huge area of Peru about which nothing is known." Isolated ridges, separated from the main bulk of the Andes mountains, often hide unique plants and animals, species that have evolved in isolation. So new birds are a real possibility on this trip. "In recent years, Peru has gone from one of the most poorly known to one of the best-known countries, in terms of birdlife," O'Neill says. "Now I have an even greater desire to finish the puzzle."

Searching geographically isolated areas is a theme of O'Neill expeditions. Ken Rosenberg, now chief scientist for the Cornell Lab of Ornithology's Bird Population Studies program, was a graduate student at LSU when he accompanied O'Neill on the 1985 expedition. "John would always be staring at the map," Rosenberg remembers, "looking for something geographically interesting." The 1987 expedition, the one Stap describes in *A Parrot Without a Name*, explored the Cordillera Divisor, a mountain "island" 100 miles from the Andean foothills that yielded a new species of parrotlet.

Another hallmark of O'Neill's work is his collaboration with Peruvian scientists. He includes Peruvian students on his expeditions and often works with Irma Franke, the curator of birds at Peru's natural history museum in Lima. "Everything we do now is 50-50 with the museum," he says. "It's good to see—students and young professionals are becoming so interested in conservation science that they're influencing Peru's laws."

KENNETH V. ROSENBERG

Searching geographically isolated areas for new bird species is a theme of John O'Neill's expeditions. Above, O'Neill in 1985 at a field camp in the Peruvian Andes.

O'Neill leaves the map on the floor when he returns to his armchair to talk about the roots of his interest in birds and art. The Yellow-headed Parrot he's painting now is a piece of his personal puzzle: from the parrot's owner, back in the early 1950s, O'Neill's godfather purchased three Golden Pheasants—a gift for a seven-year-old boy who'd just moved to the Texas countryside with his parents. "I already had some bantam chickens," O'Neill remembers, "but the pheasants really set me off raising birds. From then on I raised all sorts of things—doves and finches, poultry, fancy pigeons."

He had already started painting, with some half-used, cast-off tubes of oil paint. "I just kept at it," says O'Neill. "The only time my mother was ever called in for a school conference was because I was drawing when I should have been paying attention."

On a high school birding trip to Baton Rouge O'Neill met then-director of the LSU museum, George H. Lowery, Jr., who signed a copy of his just-released book, *Louisiana Birds*. Neither one imagined that the student would one day step into the scientist's shoes. "I never thought much about the consequences of studying birds," says O'Neill. "It was just something I was determined to do."

Another high school trip, to eastern Mexico, crystallized O'Neill's interest in tropical birds. He had previously read *Mexican Birds: First Impressions*, by George Miksch Sutton. "So after the trip I applied to the University of Oklahoma, where Sutton was teaching," says O'Neill. The artist and ornithologist treated him like a graduate student, giving him desk space at the university museum and casually critiquing his paintings.

His first week at college, at a local bird club meeting, O'Neill met his Peru connection: an older couple who, later on, announced their plans to spend a year in Peru and casually invited him to visit. "A lot of times people just say something like that," grins O'Neill, "but I didn't let it pass. I said yes as fast as I could."

On his first trip O'Neill collected specimens that Sutton encouraged him to send to Lowery at the LSU museum. They became the nucleus of what is now one of the foremost South American collections in the United States. "Lowery was excited enough by the birds to find money for me to go back the following year and, as it evolved, I just kept going every year," says O'Neill. His first new bird, the Orange-throated Tanager, came on his third trip, when he was still an undergraduate.

O'Neill earned his Ph.D. at LSU in 1974, then worked in the museum, first as a curatorial assistant, and then as chief curator, while continuing to travel to Peru each year. "I was also painting a lot by then," he says; he did the plates for Richard ffrench's *Field Guide to the Birds of Trinidad and Tobago* in 1973. In 1978 Lowery died and O'Neill became director, a position he held for five years. But he liked art and field work better than paperwork, so eventually he asked to step down from the directorship and work as the museum's Coordinator of Field Studies.

In 1987 O'Neill left that position to have more time to pursue his art. "I didn't want to fall into the publish-or-perish syndrome," he says. "I concluded, when I'm dead and gone, the artwork will be more important than the scientific publications. Sure, I do something special by collecting information in Peru, but anybody can write it up. Whereas art, there aren't that many people who could leave a similar body of work." He pauses, then laughs. "Plus I really enjoy it." ■

Flying Field

THE UNSCIENTIFIC METHOD

by Mel White

Who cares about a dime-a-dozen bird with a hurt wing?

When a lawyer gets The Rescue Call, it's somebody whose son smarted off to the cops. For a doctor, it's anxious parents with a feverish baby. For birders, it's The Cardinal with the Hurt Wing, and I suppose we should feel lucky. Given the habits of birds, our phones usually ring at a reasonably decent hour.

"We got home from work and found a cardinal on the patio, and it was acting real funny, you know? We remembered that you like birds, so we thought we'd call you up and ask you what to do. We think it has a hurt wing."

Never a concussion, or syncope, or senility. Always a hurt wing.

For many years I had a standard response for these calls. It was partly true conviction, but mostly, I know now, just a pose. I was trying to show that birders weren't bleeding-heart effetes, "bird-lovers" who went into a dither about anything with feathers.

"Okay, I'll tell you what to do," I'd say. "You willing to devote a little time to it?"

"Uh, sure."

"Okay. First, decide how many hours you'd spend on this. Then figure out how much your time is worth. Ten dollars an hour? Fifty? Multiply that out. Now sit down and write a check to The Nature Conservancy, and send it in with a note telling them to buy land somewhere. And forget the dumb bird."

Confused silence. "But . . . I hate not to do anything for it. It seems like such a waste. It's so beautiful."

"Yeah, I know. Look, I don't mean to sound cold-blooded or anything"—actually, of course, that was exactly how I meant to sound—"but cardinals are a dime a dozen. That pair in your backyard has three broods a year, four or five eggs every time. If they all lived, we'd have to start spraying for them. We'd have to put cardinal-excluding doors on our houses. If you really want to do something worthwhile, help save some habitat somewhere. Let's face it: ten million birds die every day."

Oh yeah, I'm sure those people hung up the phone with a whole new impression of bird watchers. Namely, that some of us are heartless, didactic jerks.

It's still a puzzle to me, given my attitude, how one summer day I ended up with a flightless kingfisher. It must have been the novelty of the circumstance—not a cardinal or a robin, but a two-for-a-quarter bird, at least. Friends had found it in their yard downtown. How on earth did it get there? When I went to have a look it was sitting in the corner of a cardboard box, crest raised, full of spunk but helpless. Its wing was hurt, I think.

The day before, this little critter had been the ratchet-voiced terror of the bayou, and now it was lost, far from home in more ways than one. On the way to the vet's office it sprawled in the box, looking unavoidably frumpy, but scrappy, wide-awake, alert as a mad rattlesnake. Obviously, the problem was purely mechanical.

After laughing at the sardines my friends had put in the box, the vet wasted no time on irrelevant emotion. A bird like that, he said, has bones too small to fool with. It's not an eagle or anything. There's really only one thing to do.

I couldn't walk away from my part in the deed. Even a crippled kingfisher could do some damage with that wicked long bill, so I had to hold it for the injection. I felt its heat and muscle in my hands as the vet's syringe sucked poison from a vial; small nerves protested the needle.

Its eyelids fought against closing. The dying of the light came with two nods of that bushy head, the second limp and irrevocable. Ten million and one.

And so long, scientific detachment.

When I was a kid my neighbor, a pioneering and hard-working conservationist, avidly trapped House Sparrows and chloroformed them by the double handful in a two-gallon pickle jar. Looking on, I thought: You bet. Save the bluebirds.

Why, then, was this kingfisher different? I think of the defiant fire in its eye—the way, despite its hurt, it seemed only too ready to spindle my hand like a piece of cheese—and, especially, the binary finality of its quick death. On, off. Alive, not alive. There. Not there.

Banders handle wild birds all the time, but it's a rare thing for most of us. Especially rare, for me, to hold another one so soon after. The day it happened, I was helping a disparate bunch of biologists, researchers, and land managers work with Red-cockaded Woodpeckers in a patch of pine woods in eastern Arkansas, counting and identifying individuals and trying to figure out where they were roosting.

As most birders know, the Red-cockaded Woodpecker is a genuinely endangered species. From Maryland to eastern Texas, scattered populations nest in mature living pines with "red-heart" disease, a fungal infection that makes the trees' wood easier to excavate. The woodpeckers need open, park-like pine stands, without small trees and shrubs cluttering up the understory—conditions once maintained by fires that regularly swept through the great woodlands of the South. Today, the big timber conglomerates cut down most of those woods long before the trees get old enough for the woodpeckers, and foresters suppress fire with all the fervor that preachers in the little piney-woods churches go after sin.

Even in the context of the species' precarious situation, the tiny population at Pine City is teetering on the edge. Separated by miles of swamp and row crops from any other suitable woods, their home is an isolated 160-acre tract set aside as a preserve specifically for them. It's not great habitat, but unless they join a colony of Red-winged Blackbirds and learn to eat rice it's all they've got.

On an energy-expended-per-ounce-of-biomass basis, an awful lot of effort has gone, for many years, into helping these beleaguered birds. Crews clear underbrush from around roost trees and set prescribed fires to discourage hardwoods. They nail wide aluminum bands around trees to repel snakes, and install metal restrictor plates to keep Pileated and Red-bellied Woodpeckers from enlarging and usurping cavities.

Much of this is volunteer labor, these work parties and censuses, trying to give the birds every possible chance to hang on. Some of the work takes place on weekends, when other activities compete for people's time. It's not easy to recruit helpers: you need to be there at dusk to see the woodpeckers come to roost, and it's a long way to drive to spend Saturday night swatting mosquitoes and brushing off ticks. Despite all the work, the birds' numbers here have dwindled into the single digits—recently, the low single digits—as was perhaps inevitable in such a confined and genetically exiled population.

I probably haven't helped with the birds as much as I should, but when I did I sometimes found myself thinking: Would all this work have been better directed somewhere else? Logically, would it have been more productive to spend those hours improving the habitat around one of the state's healthier populations, in a kind of conservation triage—or working for more enlightened timber management? Should we have given in to the inevitable and *just let these last few birds go?*

I was watching a researcher band a male woodpecker that day at Pine City when he held it out to me and asked if I wanted to release it. I would be joining a very select set of people, he said with mock gravity, who've actually touched a Red-cockaded Woodpecker. I laughed and took the bird, and as I felt the frantic metabolism inside the fluff I remembered the kingfisher I had picked up not long before. It would be overdramatizing things to call my thoughts then, as I opened my hand and the bird flew away, an epiphany; they were simply part of an evolutionary change. Somehow, sometime, I began to consider the difference between method and motivation, and to understand that I must not confuse them.

I still think an acre of habitat is more important than one dickey-bird. But I don't make fun any more of people who want to stay up all night feeding a baby robin with an eyedropper.

I know that large-scale habitat protection plans are vital for the future of many species. But I'm not so quick to criticize the priorities of people who spend their time fighting to save a few shade trees while Congress decides the fate of millions of acres of wild lands. A conservationist is somebody who decides to draw the line someplace, and it just might be that the simplest, most atavistic instincts and emotions inside us—the joy in life and the sadness in death, even the death of one backyard bird—are more important and more persuasive than reason and research in giving us the will to do it.

These days, the people I'm most skeptical of are the biologists (and birders) whom I've been with in the field and whom I've never seen stopped in their tracks by the sheer unquantifiable beauty of a Hooded Warbler or a Scarlet Tanager—or, for that matter, of a cardinal. And the attitude I'm most wary of is one that's indifferent to the fate of a single bird, or an isolated population, because I don't know how far down the slippery slope of pragmatism it might be willing to go.

These days, when somebody asks me why we should save the Spotted Owl or the prairie mole cricket or the small-headed pipewort, I don't always feel like relying on science and logic. I don't always feel the obligation to elucidate ecosystems and indicator species and biodiversity and the interrelatedness of living things, et cetera.

"I'll tell you how come," I say. "Because God put 'em here. What the hell makes you think you've got a better idea?"

It's an answer that, to be most persuasive, ought to be given with a certain defiant gleam in the eye—and I always know where to go to find it. ■

TIM FITZHARRIS/MASTERFILE

"The day before, this little critter had been the ratchet-voiced terror of the bayou, and now it was lost, far from home in more ways than one."

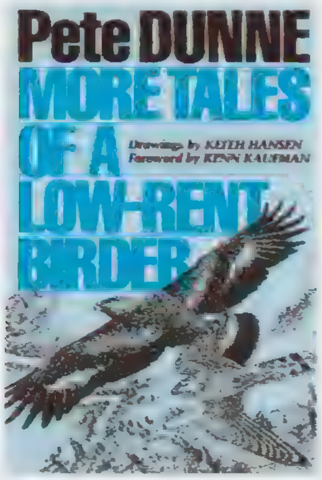
Critics' Corner

MORE TALES OF A LOW-RENT BIRDER

by Pete Dunne

Austin, Texas: University of Texas Press;
1994. Cloth, 120 pages, $18.95.

It was déjà vu all over again as I opened Pete Dunne's latest book, *More Tales of a Low-Rent Birder.* There they were again, those bizarre birding stories we'd labored over at *Living Bird,* struggling to make sure that all the periods and semicolons were in the right place. How well I remember "The Devil List," "The Wisdom of the Worthies," "The Art of Pishing," and several other gems that first appeared in Pete's "Catbird Seat" column. And then I read further and found a dozen or so essays I'd never seen before.



Pete's admirers—and I include myself among them—will appreciate this book. It rounds up some of his best writing from *Living Bird, American Birds, Bird Watcher's Digest,* and the *New York Times* into one convenient hard-bound volume, attractively illustrated with pencil sketches by Keith Hansen.

I think what I like most about this book is that it provides a more complete view of Pete Dunne than you could get from reading the essays singly as they appear in magazines and newspapers. You might have the impression from reading one or two "Catbird Seat" columns that Pete is the consummate wisecracker, poking fun at the foibles we all share as birders (and no one is a more effective heckler than Pete Dunne). But he is more than that. He is a person who cares deeply about the condition of the natural world, birds in particular. This is evident in the first essay, "A Golden Plover at Ebb Tide," in which he traces the short life of a migrating plover and its untimely doom on a New Jersey beach. In "The Song of Killing," he looks at a Great Horned Owl's attack on some mice and ponders the meaning of predation in the scheme of the universe.

But Pete is most at home when he's writing about birding. In "Silver and Gold for Josephine," Pete provides the best explanation I've ever read of why people watch birds. And in "The Devil List," he offers a hilarious view of what happens if you get too obsessed with listing.

You may have guessed from seeing the "More" in the title that this book is a sequel—the earlier book, *Tales of a Low-Rent Birder,* was published in 1986. If you like *More Tales of a Low-Rent Birder,* you'll be happy to know that the University of Texas Press is also publishing a new, paperback version of the first book. If you weren't a fan of Pete Dunne's before, these books may well convince you to become one. — *Tim Gallagher*

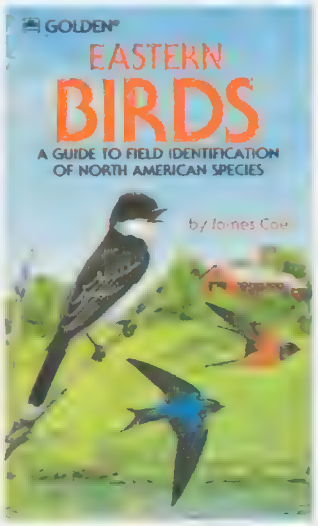
EASTERN BIRDS: A GUIDE TO FIELD IDENTIFICATION OF NORTH AMERICAN SPECIES

by James Coe

Racine, Wisconsin: Golden Press; 1994.
Paper, 160 pages, $10.95

When I was first handed a copy of James Coe's new field guide, aimed at novice and casual birders, I was skeptical; I had seen too many poor attempts with inaccurate illustrations and misleading text. After just a few seconds of glancing through this book, however, I was truly impressed; not only were the illustrations beautiful, they were some of the most accurate depictions for many species that I have seen in any field guide.

In an effort not to confuse or intimidate beginning birders, Coe keeps his plates uncluttered, with relatively few species pictured per page. Birds are depicted in lifelike poses, often against natural-looking backdrops, rather than the more traditional "cookie-cutter" arrangements used by other field guides. Subtle differences in shape and posture are captured with surprising accuracy, and insets illustrating birds in flight or typical behaviors add to both the aesthetic appeal and the usefulness of the plates. The brief text provided for each species (on the facing pages) offers interesting tidbits on habitat or behavior, but is variable as to whether vocalizations or plumage variations are described. The tiny range maps are accurate, but generalized, and are curiously omitted for quite a few species.



The most innovative feature of this guide is a series of "master plates" that illustrate either typical bird habitats filled with the species most likely to be seen there or groups of similar-looking species, all cross-referenced with page numbers to the main plates. My favorites are four plates of "confusing songbirds" that compare, for example, unrelated but similar brownish and streaky or greenish birds with eye-rings and wing-bars. These illustrations are so accurate and helpful, they are worthy of inclusion in even the most "advanced" field guide. With these plates, plus insightful and easy-to-read introductory sections covering "bird watching basics," this guide admirably fulfills its goal of reaching out to the novice birder.

My criticisms of this book center on what was left out, namely about one-third of the bird species occurring in eastern North America. Admittedly, some of these additional species are only accidental strays, but many are common or widespread enough to have warranted inclusion. When I evaluate a new field guide, I always check a set of difficult-to-identify species that are often poorly illustrated in many guides. This list includes Philadelphia Vireo, Lincoln's Sparrow, Connecticut Warbler, and Baird's Sandpiper—species that nearly always stump the novice who stumbles upon them. This guide's solution to these problem species was simple—omit them completely! Not even a mention of their existence; to the blissful beginner who uses this book, only three species of large gulls need to be sorted out, there are only two *Empidonax* flycatchers and only four kinds of sandpipers, and jaegers don't even exist!

This book was produced under the false (in my opinion) assumption that beginning birders don't want to know the full range of species they can see and identify. When I showed this abridged guide to several novice and casual birders here at the Lab of Ornithology, their reactions bordered on anger. "Nothing is more frustrating than seeing a bird and not finding it in the book," was a typical comment. Most admitted they would have tried to "fit" their unknown bird into one of the species illustrated. And everyone I asked agreed that they would prefer a slightly larger, more complete guide that at least *mentioned* all the possible species they could find.

The real shame is that Coe's impressive talents are compromised by the incompleteness of this work. The artist's innovative yet accurate style could have made many more bird species accessible to beginners. Ironically, for example, a birder armed with this guide could easily separate juvenile dowitchers (long considered one of the stickiest identification problems in North America) but wouldn't know an adult Pectoral Sandpiper if it walked within 10 feet. I'd love to see Coe's rendition of Philadelphia Vireo or Lincoln's Sparrow. In my experience, what beginners crave is accurate and up-to-date information, presented in a straightforward and friendly style; they will only be handicapped by an abridged and oversimplified view of bird identification challenges.

My final assessment is a qualified "one thumb up." I urge the publisher and the artist/writer to consider expanding this guide in future editions to include at least all the breeding and regularly occurring migrant species in the region covered. Until then, novice (and more advanced) birders will learn much from this book, but will be forced to carry a second field guide as a backup for any species "not in the book."

—*Kenneth V. Rosenberg*

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A FLICKER DAY, FOR SURE

by Pete Dunne

The trees were touched with autumn and the branches were bowing to the wind as I headed up the drive to New Jersey Audubon's Scherman Hoffman Sanctuary. Along the way, big-bodied birds exploded into motion, flashing yellow underwings and telltale white rumps.

Going to be a flicker day on the phone, I thought, even before I parked. You spend nearly 20 years in the old natural history racket and these insights come easily.

I don't know what it is about nature that paralyzes homeowners. Maybe it's cultural estrangement; maybe it's this age's reverence for the "expert opinion," but every time somebody's suburban tranquillity is shattered by an encounter with Ma Nature, the person runs to the phone and calls *The Nature Center Naturalist!* In this age on this planet, naturalists are the arbiters in any conflict between man and nature.

The ones who tell the painters how long it takes House Finches to hatch and fledge: "Sorry guys. Better come back and paint the porch later."

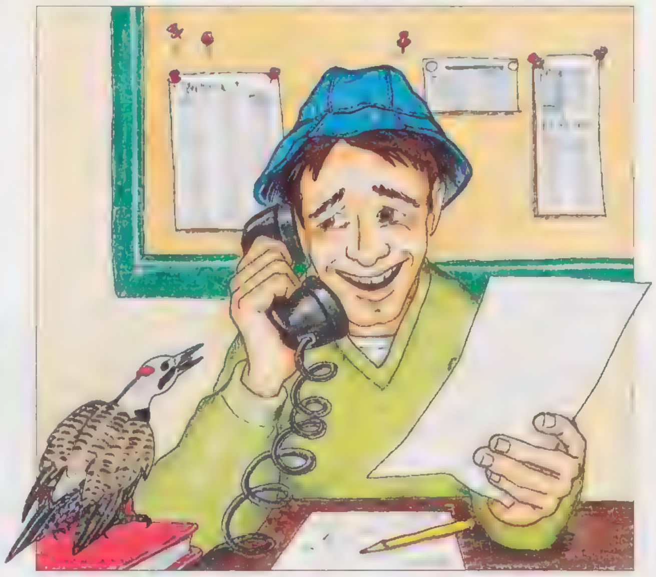
The ones who can talk a fistful of baby robins out of a possessive six-year-old's grasp, convince a 92-year-old park patron to stop throwing white bread to the ducks, and listen to a caller's description of a bird that is "orange and white and big as a crow, with a sharp beak, long legs, no tail, and circles all around its face" and *still* correctly identify it as a Killdeer.

Put some average naturalists in a sensory deprivation chamber, leave them stranded for six months, then plug them into a nature center phone line, and they'll be able to tell you the date (within a week's variance) in three calls or less.

Here in New Jersey the crisis-call calendar begins in February with the old "Kamikaze cardinal throwing itself against the window" call.

"No, ma'am, the bird is not trying to break into your bedroom. It's just seeing its reflection in the window and defending its territory from a perceived rival."

In March the calls move on to woodpeckers that drum a morning tattoo on drainpipes, in April to House Finches that fuse screen doors shut with their nests, in May to domestic-minded Barn Swallows that undermine the aesthetic integrity of garage parked cars, before moving on to the seasonal flood of "BBCs" (baby bird calls) that command the summer months.



And then comes October and in suburban neighborhoods, all across America, residents wake up, look outside, and see this strange bird . . .

"It's all brown with black spots," they explain. "It has a red patch on the back of its head and a great big black V on its chest. It's been sitting on my lawn all morning and . . ."

Not all callers that nature centers entertain are cordial. I recall one irate homeowner, who lived near the Stone Harbor Heron rookery, who was incensed that a big white bird was standing in his driveway. He demanded, "as a taxpayer," that I come and remove the bird.

My elaborate reply involved the essence of free will, an exploration of Great Egret fledging behavior, and a lecture on the importance of self reliance and self determination in American culture.

He still insisted that I come and remove the bird.

I went on to explain the subtle difference between tax-supported government agencies and tax-exempt research and education facilities, at which point he screamed that he would "have my job for this" and then hung up.

Honesty compels me to admit that not all the responses nature centers make to pleas for assistance are cordial, either. I recall one harried director of a coastal research center who impetuously and inopportunely answered the phone one day. After five minutes of not being able to get a word in edgewise, and then learning that the injured bird compromising his schedule was "*a blasted pigeon*," the director (who was, oh-by-the-way, a marine biologist, not a birder) suggested that the caller "step on its head!"

That center's funding, needless to say, was heavily endowed—*not* dependent upon contributions from the general public.

While I understand the time constraints of busy nature center directors, I always try to be cordial to crisis callers, even when I cannot be helpful. But I have demands upon my time, too. When I get to work at 7:30 A.M., my docket is clogged. Calls that come in before regular work hours are dispatched with alacrity.

Sure enough, the phone was ringing when I put my key in the door. It continued to ring as I went into the kitchen and started brewing coffee. It stopped, then started again as I moved for my office. I picked up the phone on the fifth ring.

"It's a flicker," I chanted into the mouthpiece.

"What?" a startled voice inquired.

"It's a flicker," I repeated in my most cheerful voice.

After a stunned silence, the man cautiously inquired: "Is this the Audubon Society?" I replied affirmatively.

"Oh, good," he said. "Maybe you can help me. There's this strange bird sitting on our lawn. It's all brown, with black spots and . . . "

No doubt about it. A flicker day, for sure.■

ILLUSTRATION BY JEFF SIPPLE

Learn to Record Bird Sounds

STEVE PANTLE (2)

Top photo: Participant Joe Guinn (left) and instructor Dave Herr prepare to record grassland birds at the 1994 Sound Recording Workshop. Above, workshop participant Jeannine Koshear aims a shotgun microphone at a singing bird.

Join the experts from our Library of Natural Sounds for the Lab's annual Sound Recording Workshop (June 3-9, 1995), a unique educational program for recordists of all abilities, from beginners to professionals.

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For more details, write or call the Library of Natural Sounds, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850; (607) 254-2404. FAX (607) 254-2439. e-mail: libnatsounds@Cornell.edu

LIVING BIRD

For the Study and Conservation of Birds

SPRING 1995

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LIVING BIRD

SPRING 1995 VOLUME 14 NUMBER 2

GREETINGS FROM SAPSUCKER WOODS

I'll never forget reading Henry David Thoreau's description of a Merlin he saw one spring morning. Writing more than a century ago, he rhapsodized on the power and grace of this tiny falcon: "It was the most ethereal flight I had ever witnessed. It did not simply flutter like a butterfly, nor soar like the larger hawks, but it sported with proud reliance in the fields of the air."

Anyone who's had an encounter with this remarkable bird can relate to Thoreau's sense of awe at the sight of a Merlin in action. Whether they're dashing into view on a mudflat, putting up clouds of panicky shorebirds from horizon to horizon, or flying high above a migration hotspot, diving at every other raptor in sight, Merlins make their presence known.

This winter a Merlin in Syracuse, New York, came streaking low over a busy street, chasing prey. An automobile cut short her hunt, striking her down and breaking her wing. Luckily, someone brought her to Cornell University, where a veterinarian treated her. She spent three months in a flight pen after her wing mended, but she was still not fit to be released. Her wing was stiff and she tired easily. Clearly, she needed more exercise than she could ever get in an enclosure, no matter how large.

I've been working with her for the past six weeks, using falconry techniques to get her into shape. Each day I turn her loose in a local field and call her to a lure (a small leather pouch with meat attached) at the end of a six-foot line. The Merlin makes power dives again and again, trying to snatch the lure away as I swing it around. Every time she comes close, I twitch it out of her way, until she gets lightly winded. Then I let her catch it.

Her wing is still a little stiff, but each day she makes one or two more dives at the lure before she tires. Though she's not as strong as a wild Merlin yet, I feel optimistic about her recovery. Perhaps someday soon she will once more be free, sporting "with proud reliance in the fields of the air."

—Tim Gallagher
Editor-in-Chief

Cover: Is that a Northern Flicker or a Yellow-shafted Flicker? Only the AOU's Committee on Classification and Nomenclature knows for sure. Read more about this august group on page 30. Photograph by Wayne Lankinen.

Right: In the Florida Everglades, a rare Snail Kite dines on its namesake, an apple snail. Story on page 22. Photograph by Irene Hinke Sacilotto.

Back Cover: Which way to the nest? An over-enthusiastic Carolina Wren gathers nest material by the beakful. Photograph by Marie Read.

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Letters

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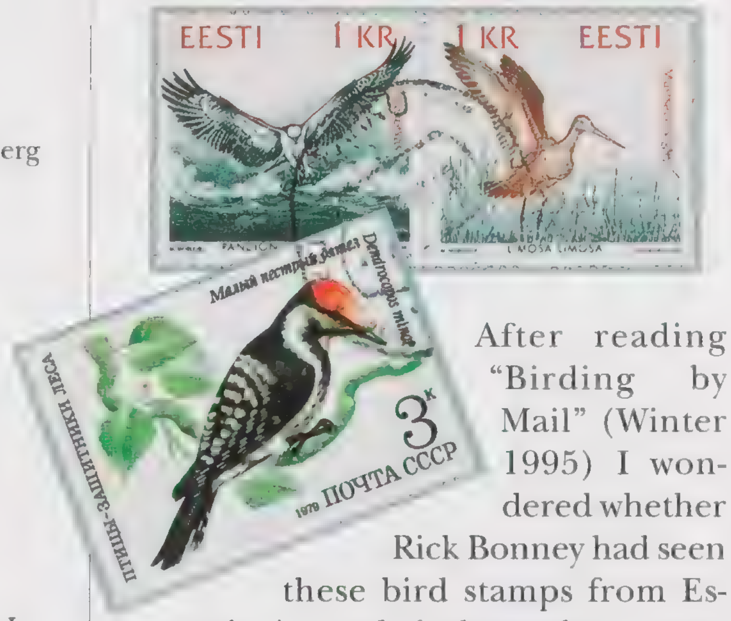


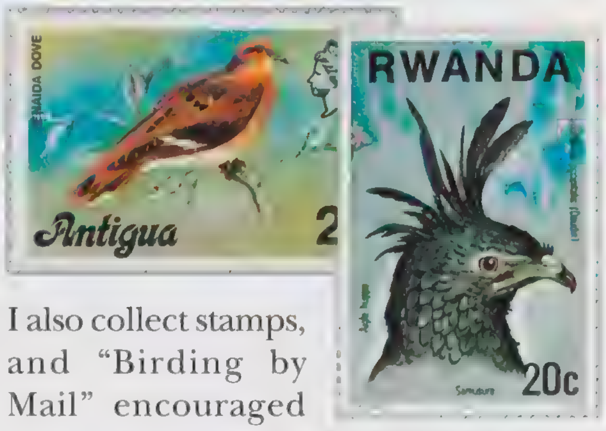
After reading "Birding by Mail" (Winter 1995) I wondered whether Rick Bonney had seen these bird stamps from Estonia (a newly independent country as of August 1991). Rick mentioned that he collects woodpecker stamps, so I'm also sending him a Russian woodpecker.

Juta Beauchamp
Rio Rancho, New Mexico

I must tell you that the Winter 1995 issue of *Living Bird* is the best and most enjoyable magazine I've ever read. What writing! What editing!

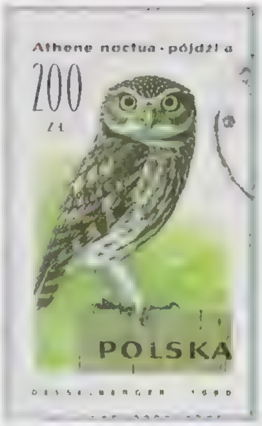
P.S. I'm sure Rick Bonney has seen the beautiful stamp on my envelope.

Barbara Adler
Pittburgh, Pennsylvania



I also collect stamps, and "Birding by Mail" encouraged me to go out and get some bird stamps this weekend. Here are my duplicates, to add to the Lab's collection.

Jody Enck
Ithaca, New York



Just finished reading Rick Bonney's article on stamps and remembered one that someone had forwarded to me a couple of months ago. Luckily it was not crushed in my dreaded junk drawer of no return, so I thought I would pass it along to you.

Fred Bertram
Geneva, New York

UR MISTAKE

Regarding "The Great Dinosaur Debate" (Autumn 1994) by Alan Feduccia, the incorrect decoration of the word "Urvogel" (in the singular) with an umlaut and failure to capitalize the noun made me nervous about accepting his theory.

Perish forbid that this was the editors' doing; at any rate you failed to catch the error. Somebody should clean up their act. *Bitte, bitte!*

Margaret Rusk
Syracuse, New York

Oops! The correct usage is "Urvogel" *for one* Archaeopteryx, "Urvögel" *for two or more.*

MISSION STATEMENT

Thank you for an excellent magazine and newsletter. Your publications have the proper mix of serious and nontechnical articles. I am also pleased that you have the good sense to stick to your subject.

You are now the only conservation organization that I am supporting. I hope you stick to your mission of the study and conservation of birds so that I can continue to do so in the future.

Patricia Witchel
Gilgo Beach, New York

We welcome letters from readers.
Address letters to: The Editors,
Living Bird, 159 Sapsucker Woods
Road, Ithaca, New York 14850.

BirdNews

STEPHEN KIRKPATRICK

The latest threat to migratory songbirds.

OH, DEER

As if forest fragmentation, habitat loss, and hungry nest predators weren't bad enough, U.S. Forest Service biologist David DeCalesta says deer may be partly responsible for the recent declines in some migratory forest songbirds (*Journal of Wildlife Management*, vol. 58, pp. 711-718; 1994).

Deer don't eat birds or compete with them for food or nest sites. But they do munch on tree leaves and other low-growing plants, thinning out the forest canopy. To find out how this pruning affects birds, DeCalesta put small herds of white-tailed deer in fenced forest plots in Pennsylvania, then censused birds on each plot for 10 years.

He found that the more deer per plot, the fewer birds and the fewer species of birds were present. With population densities of more than eight deer per square kilometer, birds such as the Eastern Wood-Pewee, Indigo Bunting, Least Flycatcher, Yellow-billed Cuckoo, and Cerulean Warbler disappeared from the plots altogether.

In managing habitat for neotropical migrants, says DeCalesta, it isn't enough to prevent human-caused disturbances such as forest fragmentation. We also have to prevent deer from eating birds out of house and home. He recommends managing deer herds to keep population densities below four to eight deer per square kilometer.

GREAT BY DESIGN

Living Bird magazine is a 1994 winner in the prestigious national magazine competition called the Ozzie Awards. Our gold award was in the category "Best Overall Design of an Association, Nonprofit, or Government Magazine." *Birdscope* also received honorable mention in the category "Best Redesign of a Newsletter." Design director Kat Dalton deserves the credit for making your favorite bird magazine a thing of beauty.

PLANT PROTECTORS

Insect-eating birds help trees stay healthy, according to a recent study by Robert Marquis of the University of Missouri and Christopher Whelan of the Morton Arboretum.

Marquis and Whelan put white oak saplings in wire mesh enclosures that let insects in, but kept birds out. Over the course of two summers, the researchers compared the surface area of leaves on their "captive" trees with those of uncaged oaks *and* oaks that had been sprayed with insecticide.

The researchers found more than 100 different species of insects, mostly caterpillars, feeding on the trees. The prediction that bird-proof trees would have the most chewed-up leaves was supported: at the end of the study, the caged trees had lost 34 percent of their leaf area to hungry insects, compared to a 24 percent leaf loss in the uncaged trees and a mere 9 percent loss in the pesticide-treated trees.

In other words, birds aren't as efficient as commercial pesticides at controlling insects—but they do a pretty good job, and they're a lot cheaper and safer. This study adds a new dimension to environmentalists' concerns over recent declines in migratory songbirds. With fewer birds to control leaf predators, the whole forest may suffer.

BRAIN POWER

Imagine you're a Black-capped Chickadee, and autumn is coming. New birds will join your flock, jostling for a place in the pecking order, and your home range will expand. At the same time, food will be scarce, and you'll have to start hoarding. How do you deal with your new flockmates, navigate a larger territory, and remember where you hid your dinner? According to two recent studies, you just boost your brain capacity.

In one study, Fernando Nottebohm of Rockefeller University and his colleague Anat Barnea, now of Tel Aviv University, compared free-ranging chickadees to others living in an outdoor aviary stocked with food. Examining the wild birds' brains, they found that in October, large numbers of new cells appeared in a region called the hippocampus. (This region seems to play a role in spatial memory for humans.) The caged birds, on the other hand, showed little brain cell growth.

In a related study, Cornell University researcher Timothy DeVoogd and students Tom Smulders and Dan Sasson found that the chickadee's hippocampus is largest in October. It shrinks in the spring and summer—when the living is easy.

Nottebohm proposes that in balancing the temporary need for better brain power with the need to stay light for flight, chickadees have evolved a "renewable brain." New cells get made and used when they're needed; then the brain discards them.

Humans, on the other hand, can't make new neurons. If scientists can figure out how the birds do it, the discovery may offer hope for people who suffer from neurodegenerative disorders such as Alzheimer's disease.

COMPILED BY CYNTHIA BERGER

Spotlight

THE ONE THAT GOT AWAY

by David Wilcove

Reflections on a rare bird and a special place

When I was a graduate student, I was surrounded by outstanding ornithologists—intrepid men and women who, with machete and mule, hacked their way up remote Andean mountains or slogged through New Guinea rainforests, bringing back specimens of mysterious, rare birds. Stacked up against their exploits, my own bird-watching accomplishments—a late migrant here, a slightly out-of-range vagrant there—seemed paltry. But in the words of Marlon Brando, "I coulda been a contenduh." A little over a decade ago, I was in the right place at the right time to make a discovery that would have impressed even my most jaded colleagues. This is the story of a very rare bird (which I never saw) and a very special place (which I never forgot).

In 1983 I was part of a group of Princeton University students and faculty members visiting western Mexico. On January 27 we packed up our tents and sleeping bags and drove from Ixtapa into the heart of the Sierra Madre del Sur mountains in the state of Guerrero. We spent the next two days studying birds and plants in one of the most remarkable places on earth.

Here the tropical and temperate forests come together, producing a canopy of enormous elms, oaks, and pines and an understory consisting almost entirely of tropical plants. The birdlife exhibits the same blend of temperate and tropical elements, with Ruby-crowned Kinglets and Townsend's Warblers occurring alongside Emerald Toucanets and Masked Tityras during the winter.

We spotted some wonderful birds during that trip, but I suspect we drove right by the biggest prize of all, because in 1986, almost three years to the day after we left the Sierra Madre del Sur, a team of Mexican biologists visited the area and found a tiny hummer with a buffy stripe across its rump and reddish feathers on its crown. They must have stared long and hard at the little bird and scratched their heads in amazement, because that particular hummingbird had been recorded in Mexico on only one other occasion. On May 9, 1947, collector Charles Lamb captured two individuals in the Sierra Madre del Sur. Back then, they were identified as Rufous-crested Coquettes, a species known only from South America, Panama, and southern Costa Rica.

So out-of-place did Lamb's record seem that ornithologists tended to either dismiss it or ignore it. Peterson's *Field Guide to Mexican Birds,* for example, suggested the Rufous-crested Coquette was an "accidental" stray to Mexico, even though it boggles the mind to imagine two hummers wandering north from Costa Rica and ending up in the same patch of Mexican cloud forest on the same day. The venerable American Ornithologists' Union, arbiter of the avifauna, did not even mention the record in its authoritative *Check-list of North American Birds,* published in 1983.

The 1986 rediscovery confirmed what some ornithologists suspected all along: These birds weren't vagrants. A resident population of coquettes was living in the Sierra Madre del Sur. After examining additional specimens collected by the Mexican researchers, scientists concluded that the Sierra birds were different enough from their Central and South American kin to be considered a separate species. They have named it *Lophornis brachylopha,* the Short-crested Coquette. Thus far the species has been found only along a 25-mile stretch of potholed road winding up the mountains, giving it the smallest known range of any Mexican bird.

The rediscovery of Lamb's long-lost hummingbird may attract more bird watchers to the area (assuming the widespread reports of drug traffickers in the area aren't a deterrent), but the Sierra doesn't really need another reason to be worth visiting. It already is one of the hot spots for Mexican birds. In addition to the coquette, the Sierra Madre del Sur is home to at least a dozen other birds found only in Mexico, including such rarities as the White-throated Jay, White-tailed Hummingbird, and Long-tailed Wood-Partridge. In a recent report entitled *Putting Biodiversity on the Map: Priority Areas for Global Conservation,* the conservation organization BirdLife International (formerly known as the International Council for Bird Preservation, or ICBP) identified the Sierra Madre del Sur as one of 14 critical areas for bird conservation in Mexico.

Those of us who chase birds have a long and fond familiarity with the phenomenon of hot spots, although we rarely consider the different types of hot spots that make our hobby so

ILLUSTRATION BY JOHN SCHMITT

rewarding. Places where migratory birds congregate in spectacular numbers are perhaps the most familiar type of hot spot—places such as Cape May, New Jersey, or Point Pelee, Ontario, that become seasonal meccas for our clan. Another type of hot spot features a rich assortment of breeding or wintering species. Bird watchers fortunate enough to visit the Amazon rainforest or the rift lakes of Africa return with species lists of mind-boggling length.

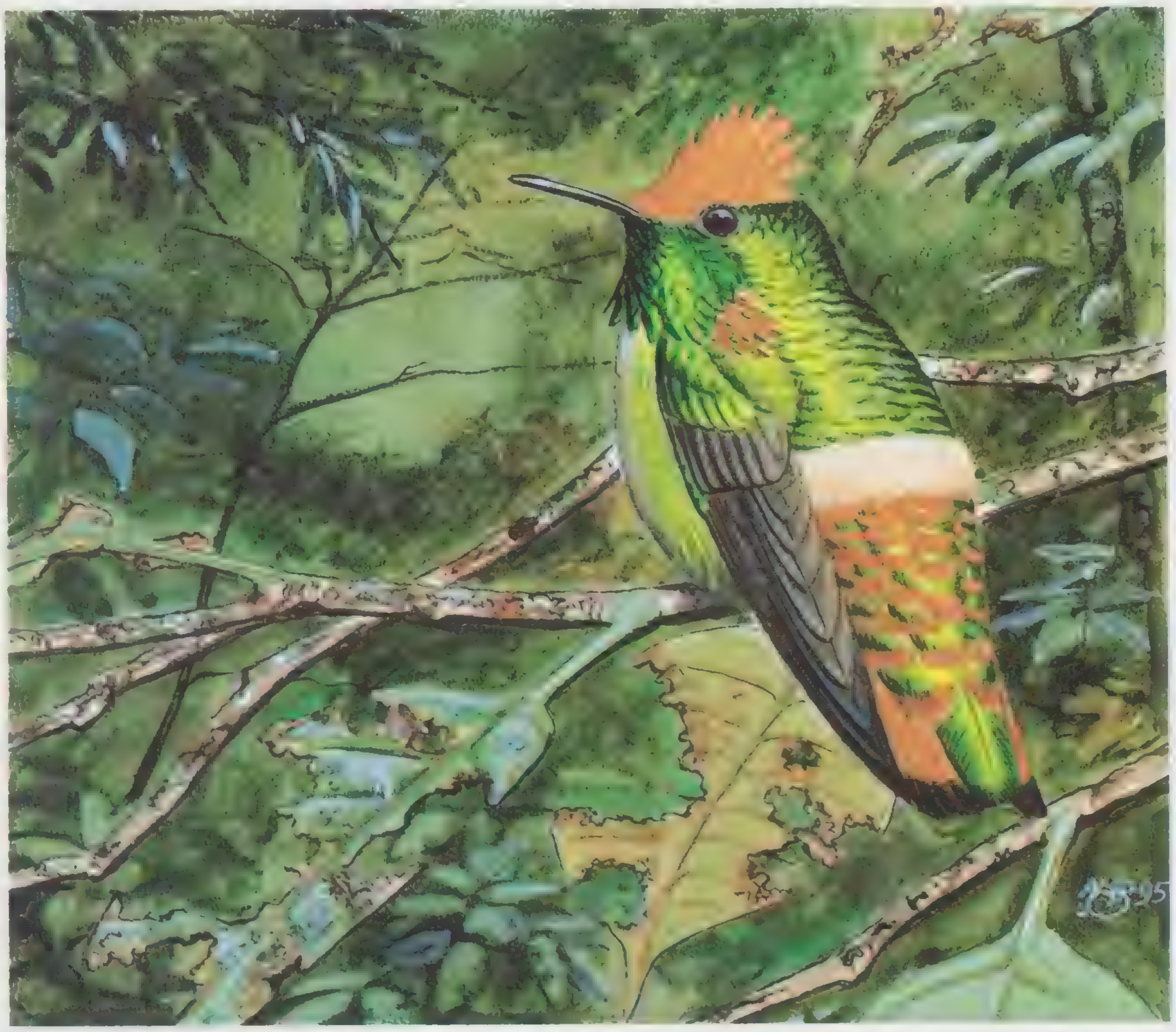
Still another type of hot spot is home to numerous species of birds that have very restricted ranges. On islands such as the Galápagos and on mountain ranges such as the Sierra Madre del Sur, time and isolation have produced a wealth of endemic species—birds that live nowhere else. Such hot spots invariably attract the attention of conservationists because, all things being equal, the smaller a bird's range, the more vulnerable it is to extinction. If we are to avert a wave of human-caused extinctions in the near future, these hot spots of endemism must be identified and protected.

BirdLife International has done precisely this in its new report. Its scientists mapped the locations of all bird species with breeding ranges of 20,000 square miles or less. (That's roughly equivalent to a square with sides of about 140 miles—a very small range for any species of bird.) Then they looked for areas where these endemic birds were concentrated. They identified 221 "Endemic Bird Areas" around the globe, areas that together total approximately 2.6 million square miles, or roughly 5 percent of the Earth's land surface. According to BirdLife International, a staggering 70 percent of the world's threatened birds and 95 percent of all restricted-range species occur in these special areas.

Moreover, limited evidence suggests that areas rich in endemic birds are rich in other endemics, such as mammals, insects, and plants. Lepidopterists, for example, know the Sierra Madre del Sur as one of the finest areas in Mexico for butterflies. It is especially rich in endemic swallowtails. Botanists rejoice in the Sierra's numerous endemic ferns. The fact that many birding hot spots are also plant or butterfly hot spots should not come as a great surprise—many of the same factors influencing avian diversity and speciation in these places also affect other organisms—but it has profound implications for conservation planning.

If we confirm that the Endemic Bird Areas of the world overlap the Endemic Plant Areas or the Endemic Insect Areas (assuming we someday know enough about plants and insects to figure out where the plant and insect hot spots are), then conservationists have some reason for optimism. Such a finding will mean that we can target a relatively small number of places to save the bulk of the world's endangered species.

I also believe a similar pattern will unfold when we look at conservation on even finer scales. In the United States, for example, opponents of the Endangered Species Act cite the growing list of imperiled species as evidence that endangered species protection will gobble up much of the nation's land. Yet the majority of endangered species are concentrated in a few key places within a few key states, including Hawaii, California, and Florida.



The Short-crested Coquette is one of a dozen bird species found only in Mexico's Sierra Madre del Sur—an area of critical concern for bird conservation.

Last June, two friends and I returned to the Sierra Madre del Sur for a few days of bird watching and botanizing. We scanned every flowering tree and bush in sight and hiked for hours up and down that stretch of road, but we never saw a Short-crested Coquette. I felt a twinge of disappointment, but we saw so many other strange and unusual birds that our failure to find the coquette didn't seem to matter all that much. Were it not for the logging trucks rumbling down the road, carrying away the forest, I would have said to my friends, "No problem. We'll find the hummers on our next trip." ■

Further Reading

Bibby, C. J., N. J. Collar, M. J. Crosby, M. F. Heath, Ch. Imboden, T. H. Johnson, A. J. Long, A. J. Stattersfield, and S. J. Thirgood. *Putting Biodiversity on the Map: Priority Areas for Global Conservation.* Cambridge, England: International Council for Bird Preservation; 1992.

Howell, Steve N. G. The Short-crested Coquette: Mexico's least-known endemic. *Birding,* April 1992; pp. 86-91.

My Turn

LUCKY SHOT

Text and photograph by Jeffrey L. Hall

A photo opportunity in Belize leads to scientific discovery

The big raptor didn't move. As I crept closer, it turned its gray head, but it seemed to dismiss me as unimportant, far more interested in the snake pinned in its yellow feet. I expected the whirring of my camera's motor drive to spook the bird, but it stayed calm. I moved even closer and wedged myself behind a tree. My light meter had been malfunctioning, so I tried every setting. I knew I would waste many shots, but I hoped some would turn out. Little did I imagine how successful my photography would be.

With the roll of film used up, I moved quietly back to the Maya mound where my wife, Dianne, stood puzzling over our *Field Guide to Mexican Birds.* We were in Belize, not Mexico, but no field guide exists for this tiny country. We were getting a remarkable look at the big hawk, yet it was frustratingly hard to identify.

When I first noticed the raptor, "Gray Hawk" popped into my head. Just as quickly I rejected the identification. The gray head and yellow feet were right, but this bird had a white, not barred, belly, and its cere (the area at the base of the beak) was dark, not yellowish.

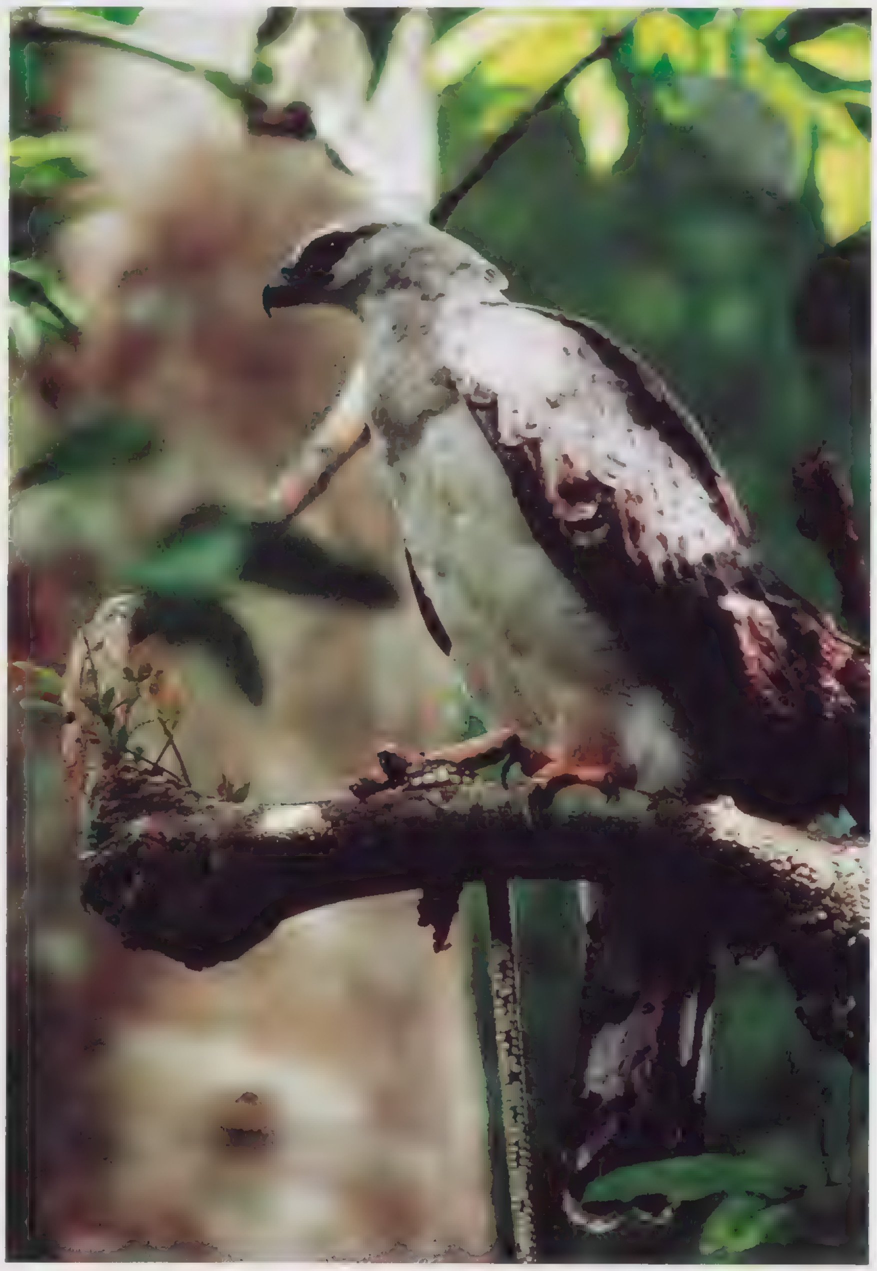
Finally we settled uncertainly on Gray-headed Kite. The dark back, gray head, and banded tail seemed a reasonable match, although kites are gracile raptors and this bird seemed tougher, more powerful. Still, nothing else in the field guide or our Belize checklist was even close. Gray-headed Kite it must be.

The raptor, unconcerned by this debate over its identity, stood placidly, gripping the snake. Just then a group of local schoolchildren appeared on the trail from Chan Chich Lodge, where we were staying. About half the group had passed before the hawk even turned on its perch. Finally, as the last child went by, the bird launched itself from the branch, the snake's body dangling from its talons.

Our 1990 visit to Belize was a journey full of wonders. Jungle hikes, Maya ruins, coral reefs, and the roar of howler monkeys in the dusk—all these and more made our trip memorable. But a final and unanticipated thrill awaited us.

After we returned home I sent a picture of the big raptor to Martin Meadows, with whom we had traveled in Belize. Martin is the manager of Warrie Head Lodge in western Belize, and he has a collection of photographs of memorable birds encountered on his expeditions. I hoped my hawk would be good enough to include in his gallery.

When Martin saw the photo, he knew the bird was no Gray-headed Kite. Using a Panama field guide, he identified it as a Crested Eagle, a bird never before recorded in Belize. The illustration in the field guide was unmistakable, even though the bird had never erected its eponymous crest while we watched it. Unwittingly, we had documented a new species for Belize.



Jeff Hall's lucky shot documented a Crested Eagle in Belize—the first record of the species for that country.

I checked the ornithological literature but found no mention of Belize as part of the Crested Eagle's range, nor of the eagle as part of Belize's avifauna. Field guides for Costa Rica and Colombia, however, did include areas of Guatemala adjacent to Belize in the eagle's range. Martin wrote that a Crested Eagle had been identified the previous year at Tikal in Guatemala, lending further credence to our sighting.

Since then, the operators of Chan Chich Lodge have also seen a Crested Eagle. Meadows published a note about the eagle in the Belize Audubon Society newsletter to alert local naturalists to the presence of the species. What a thrill it was for us to stumble upon a species never before recorded in a country, thereby contributing in a small way to a more complete understanding of the birds of Belize.

My experience shows that there is still a role in science for the amateur. Any observer can find something interesting and important in the field. At the same time, a bird watcher who turns up something puzzling shouldn't "settle for" an identification, as we did. I thought that making a first time sighting of a species outside its known range didn't happen to people like us—but it did. If I hadn't taken a good photograph, then sent it to a knowledgeable person, our find would have gone unrecorded.

As important as this lesson is, it's even more critical to realize how little we know about tropical forests. If an observant visitor can find a previously unrecorded eagle at a popular birding spot, what other, less conspicuous creatures await discovery? These forests are being destroyed so fast—what potential discoveries will never be made? What life forms will be driven to extinction before humans even record them? Our Crested Eagle reminds us that preservation of habitat becomes more important with each passing day. ■

Jeffrey Hall teaches biology at the Pennington School in New Jersey.

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BEYOND JURASSIC PARK

by Alison J. Mack

Using ancient DNA from fossils, scientists illuminate the lives of birds extinct for centuries

In *Jurassic Park*, the best-selling novel that became a hit movie, scientists recreated dinosaurs from fossilized genes. True to the tradition of science fiction, author Michael Crichton based his story on the actual technology that scientists are using today to study ancient DNA. Furthermore, many of these studies involve not dinosaurs, but birds. By searching bits of bone, skin, or feather for messages written in the genetic code, we can learn more about birds that have been extinct for centuries.

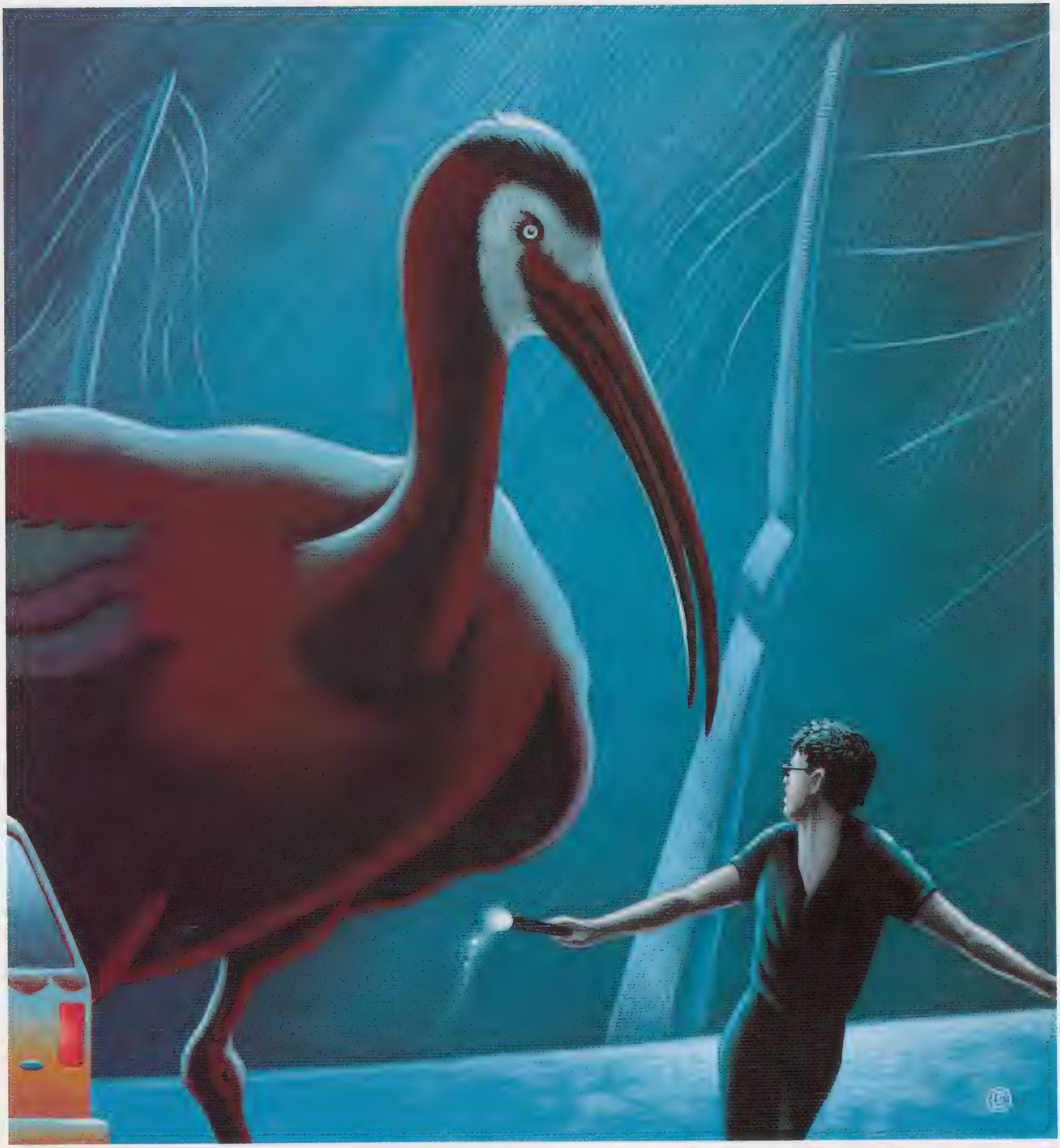
Biologists will probably never be able to bring extinct birds—or anything else—back to life using ancient DNA. For one thing, current technology can only recover a small fraction of any genome (the complete DNA "script" that encodes an organism). But by rescuing a few genes from fossil remains and comparing them with the genes of other species, both living and extinct, ornithologists are learning details about birds' ancestral taxonomic relationships, habitats, and population dynamics.

The analysis of ancient DNA plays a vital role in several studies of Hawaiian birds being conducted at the Smithsonian Institution's Molecular Genetics Laboratory, located on the grounds of the National Zoological Park in Washington, D.C. There, in the renovated basement of a former barn, a lively group of scientists applies the cutting-edge methods of molecular biology to research in population genetics, sociobiology, and systematics. "We're mainly using ancient DNA to answer evolutionary questions," says Rob Fleischer, the lab's affable director. "But there are implications for conservation in some of our work."

To Fleischer and his colleagues, the Hawaiian Islands represent a living experiment. These islands are simplified pieces of the world, where life's rules are most evident. Ever since famed 19th-century naturalist Charles Darwin made the Galápagos Islands his laboratory, his scientific heirs have studied other volcanic islands to learn how immigrant species adapt to new environments.

As the world's most isolated island chain, the Hawaiian archipelago is a prime location for such research. Ages ago, a mere handful of colonizing species—a few plants, insects, land snails, birds, and a single species of bat—were blown or washed to its shores. There they encountered remarkably diverse habitats that had evolved because of the islands' wide variations in elevation and

ILLUSTRATION BY STEVE CARVER

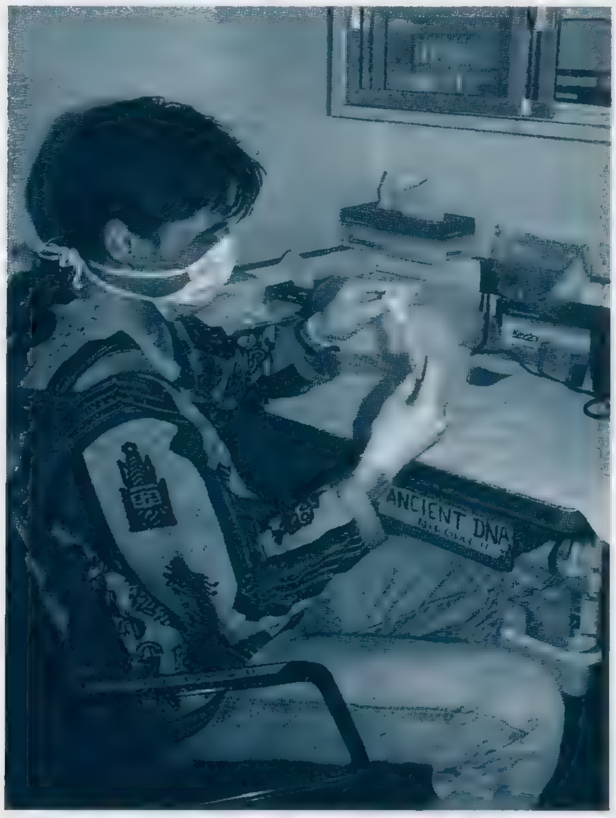


climate. On the "Big Island" of Hawaii, for example, arid coastal scrub habitat borders wet and dry interior forests, which yield to alpine desert on volcanic peaks. Responding to the varied demands of local environments, the descendants of those first colonizing bugs and birds evolved into sprawling groups of related species. Biologists call this process adaptive radiation.

The spectacular variety of Hawaiian birds is a living example of adaptive radiation. Yet Hawaii's avifauna is only a fraction of the diverse bird species that once inhabited the islands. Of the species believed to have been present when the English explorer, Captain James Cook, arrived in the late 1700s, half are now extinct. Many were hunted to extinction; others vanished when agriculture and industrial development destroyed their habitat.

These losses, however, pale in comparison to prehistoric extinctions that occurred more than a thousand years before Europeans arrived in Hawaii. Over the past two decades Storrs Olson and Helen James, avian paleontologists at the Smithsonian Institution's National Museum of Natural History, have described more than 30 new Hawaiian bird species from their fossil remains. This work more than doubles the number of extinct Hawaiian birds previously known to science. The age of the fossils and their proximity to the remains of humans and introduced animals suggest that the first people to arrive on the Hawaiian Islands caused mass extinctions. Describing their discoveries in 1982, Olson and James observed, "Authors describing the Hawaiian terrestrial biota often understandably succumb to such rapturous modifiers as . . . 'astounding,' 'unparalleled,' . . . and 'truly wonderful.' One wonders what other superlatives would have been applied to the Hawaiian biota had its true diversity been known."

Working with fossil bird remains excavated in collaboration with Olson and James, Fleischer and his colleagues hope to extend and refine the already impressive catalog of extinct Hawaiian birds. "We're using molecular methods to confirm what Storrs and Helen have already determined," says Fleischer, "and in some cases, where the morphology is very modified, we'll supply the evidence necessary to classify their samples." Ancient DNA analysis supplements traditional studies in two important ways. First, because very small pieces of bone yield enough DNA for identification, even fragmentary samples provide important information. Second, DNA analyses are more effective than traditional morphological studies at tracing the phylogenies, or ancestral relationships, of birds whose physical characteristics changed rapidly during adaptive radiation.



Alan Cooper gets ready to extract genetic material from a fossilized bird bone.

ALISON MACK

Having a bit of ancient bird is no guarantee that it will yield genetic information, however. Getting the DNA out intact is a painstaking process that often mysteriously fails, as does the tedious method for reading it. No one knows this better than Alan Cooper, a postdoctoral researcher in Fleischer's group who is currently examining DNA from several species of extinct Hawaiian ibises.

Cooper, a New Zealander, is an avid spelunker who first became interested in ancient DNA when paleontologists discovered the bones of an extinct flightless bird called a moa in one of his favorite caves. For his doctoral dissertation, he extracted DNA from these bones and compared it with DNA from related species, including ostriches and kiwis. "It's a Pandora's Box," he says of the myriad problems associated with retrieving a molecule that has somehow survived for years under conditions that are hostile to organic molecules.

One problem is that the DNA you get might not be the right stuff. Cooper recalls how he tried to extract DNA from the feathers of an extinct ibis found on Lanai. To analyze a single gene, he uses a technique known as the polymerase chain reaction (PCR). This technique selectively copies one gene out of the millions present in his DNA samples, yielding a sample that's large enough to analyze. The process is analogous to amplifying a signal of specific wavelength, such as a radio or television broadcast, above a broad spectrum of background noise. Because of the extreme sensitivity of PCR, the samples must be free of even the tiniest amount of DNA from other organisms.

When Cooper finally compared the DNA from his extinct ibis with several species of living ibises, it didn't match. "It turned out it wasn't from an ibis at all—it was human DNA, probably Storrs Olson's," says Cooper. Human DNA can be transferred from the hands of archaeologists or curators to the surface of a sample, and this fresh DNA can be amplified more readily than fragile, degraded ancient DNA present in the samples.

Cooper did recover ibis DNA from some bones unearthed on Maui by other researchers. In a sterile corner of the laboratory reserved for sample preparation, Cooper, gloved and swathed in a face mask, sanded the bone to remove any contaminating DNA from its surface, then chipped off a few small pieces to grind in an electric coffee-grinder. He extracted DNA from the ground bone by mixing it with an enzyme solution, then added the other ingredients of the polymerase chain reaction. The PCR provided him with enough copies of a single gene—the basis of his evolutionary comparison—for the next step: deciphering its chemical sequence.

Each gene is like a code, with chemical letters in a sequence that spell out instructions for a certain trait. The gene Cooper follows is known to accumulate changes in its sequence at a constant rate. Because of this, the gene's sequence can be used as a molecular clock to monitor the pace of evolution. Scientists can measure the relatedness of two species by comparing differences in the sequence of the gene. The DNA of closely related species reads more similarly than the DNA of distantly related species because, over time, more mutations crop up between distant relatives' genes. Scientists have identified many areas on the DNA strands—areas that are found in *all* genomes because they code for essential cellular mechanisms—that are steadily accruing mutations at known rates. They use one area to follow changes that occurred over 1 or 2 million years and another to follow those that took place over 50 million years.

The events that interest Cooper include the evolution of now-extinct flightless ibises from an immigrant ancestor that presumably flew to the Hawaiian islands. Scientists who have studied the remains of these ibises from Molokai, Maui, and Lanai conclude that they lost the skeletal features required for flight within as little as 1.8 million years after arriving on the islands. Their wings became too short or too weak to support their bodies, and the prominent keel on the breastbone, which anchors the muscles of flying birds, disappeared. Cooper's preliminary results suggest that the flightless ibises are genetically distinct from six living, flying species of ibis. In contrast, when Cooper looked at the same gene in an extinct Hawaiian eagle, he found that it was nearly identical to that of the Bald Eagle and very similar to its relatives, the White-bellied Sea-Eagle and the White-tailed Eagle.

Cooper speculates that the different evolutionary outcomes of immigration for the ibis and eagle indicate that their ancestors reached Hawaii at different times. The small genetic difference between the extinct Hawaiian eagle and its living counterparts suggests that it was a fairly recent arrival. In contrast, the descendants of the ancestral Hawaiian ibis diverged into separate species—a process that takes considerable time. So the ibis must have arrived on Hawaii long before the eagle.

Fossil evidence suggests that flightlessness has evolved many times in birds, sometimes quite rapidly. For example, in New Zealand the extinct Finsch's Duck lost the ability to fly over a 10,000-year period, according to paleontologist Trevor Worthy. In contrast, the acquisition of flight is a rare and lengthy evolutionary process. So, when humans colonized islands such as Hawaii and New Zealand where flightless birds had evolved, these birds couldn't quickly re-evolve the ability to fly. As a result, they were easy prey for human hunters and the cats, rats, and dogs they brought with them. The combined effects of predation and human agricultural practices led to the extinction of vast numbers of birds.

Like Alan Cooper, Eleni Paxinos spends long hours coaxing ancient DNA from the remains of Hawaiian birds, but for different purposes. A graduate student from Brown University, Paxinos joined the Molecular Genetics Lab to study the effects of bottlenecks—drastic reductions in population sizes—on the Hawaiian Goose, also known as the Nene (pronounced "nay-nay"). "After the Polynesians and Europeans arrived," she explains, "the Nene was reduced from something like 25,000 birds to five or six maternal lines. I'm asking this question: What effect has this reduction had on the population's genetic variability?" Paxinos intends to learn the answer by studying living Nenes and the remains of birds that perished in the population crash, comparing the sequences of a genetic marker that can reveal the most subtle of evolutionary changes.

Her results may have important implications for the U. S. Fish and Wildlife Service's management of the Nene and perhaps other endangered birds. "If a bird species on an island has low genetic variability, is that a big deal?" asks Fleischer. "It isn't if the species has lived that way for a long time." That would mean the species has survived despite the genetic diseases that are often a consequence of inbreeding. "But if they've only recently lost the variability," she says, "you may have a problem."

Unfortunately, says Fleischer, some decisions about captive breeding of endangered species have been made under the unproved assumption that all island species have low genetic variability. Using ancient DNA, Paxinos can now test that assumption in the Nene. If the sequence of the gene she hopes to extract from ancient remains proves to be far more variable than the gene in living birds, it will suggest that the recent bottleneck reduced genetic variability. For the birds that remain, the risk of inherited disease could be high. Says Fleischer, "Captive propagation might be more problematic than we think."

Paxinos notes that the Nene has not responded well to some captive propagation attempts. "In some of the captive-bred populations, the goslings have annual mortality rates of above 40 percent, whereas 9 percent is typical for geese," she says. "One of the flocks may have come from lowland stock, and that could explain why they're not doing well in the highlands." To help situate future captive propagation programs where the founding birds are most likely to thrive, Paxinos will attempt to determine the ancestral locales of the living Nene lines. To do this, she will compare ancient Nene DNA from remains found in a wide range of habitats to DNA from living birds.

Applying the same rationale, Fleischer, Cooper, James, and Judith Rhymer, a biologist from Clemson University, plan to examine DNA from the remains of a small duck found in high-altitude caves on the island of Hawaii. The bones resemble those of an endangered species currently confined to the tiny island of Laysan. If the DNA analysis confirms this resemblance, it will suggest that the Big Island's highlands could be a good site for a Laysan Duck captive breeding program, even though the habitat is very different from that of low-lying Laysan Island.

These ancient DNA research projects at the Smithsonian Molecular Genetics lab are among the first of their kind. Like archaeologists deciphering the Rosetta Stone or the Dead Sea Scrolls, scientists reading the language of ancient genes have begun to gain new insights on the past, as well as new ways to interpret the present. And as DNA extraction and amplification methods, now less than 10 years old, improve, the contributions these techniques make to science are likely to multiply.

Although Fleischer and his colleagues cannot bring the legions of extinct Hawaiian birds back to life, they are increasingly able to describe these birds' histories in detail, and they may discover more effective techniques to conserve endangered species. The messages inscribed in ancient DNA illuminate the past, and they may also inform the future. ■

Alison Mack is a freelance science writer and a graduate student at Johns Hopkins University. She lives in Wilmington, Delaware.

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THE RIDDLE OF THE IBISES

by Keith L. Bildstein

CHUCK DRESSNER

Why did the East Coast's largest White Ibis breeding colony disappear?

APRIL 7, 1991: It is early afternoon in the coastal backwaters of the South Carolina Low Country. A small aluminum john-boat skims the murkiness of Mud Bay several miles east of the colonial port of Georgetown. Trying to beat a falling tide, Katie Golden and I rush at full throttle toward Pumpkinseed Island, a 15-acre chunk of salt marsh that, until last year, hosted the largest breeding colony of White Ibises on the entire Atlantic Coast of North America. In 1990, however, no White Ibises bred at the site.

We have one question on our minds: After last year's hiatus, will White Ibises return to Pumpkinseed Island?

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As Katie and I approach the island we spot two huge flocks of sickle-billed wading birds bobbing and weaving in their indisputable courtship flight several hundred yards above the horizon. Turning the boat around to get a better look, I confidently proclaim that White Ibises have returned to the Pumpkinseed colony site. A second glance reveals that I have jumped the gun. Both flocks consist entirely of look-alike Glossy Ibises, a closely related species but not the subject of our study.

Disappointed but not altogether surprised, we continue to the north end of Pumpkinseed Island, where we are welcomed by a rising cloud of White Ibises—the genuine article. The startled birds, an intent assemblage of several hundred males and females that had been trampling a stand of black needlerush, promptly resettle in the vegetation. Most of the birds proudly display the scarlet faces and crimson legs of courting adults, and many resume their pair-bonding activities. Our question answered, we retreat to the boat.

I've been studying the ecology of Pumpkinseed's White Ibises for over a decade, as an avian ecologist at the University of South Carolina's Baruch Institute of Marine Biology and Coastal Research and as a biology professor at Winthrop University. Until the previous season, I had never even considered asking whether or not White Ibises would return to Pumpkinseed. The island had regularly hosted upwards of 20,000 pairs for at least the last 20 years. Annual breeding populations had averaged over 7,000 pairs throughout the 1980s; numbers at Pumpkinseed had never dropped below 1,900 pairs. The birds were a predictable, abundant, and ecologically significant component of the island's avifauna. So the question of why the White Ibises failed to breed in 1990 was of no small consequence.

IF SALT IS SUCH A PROBLEM FOR IBIS NESTLINGS, WHY ISN'T IT A PROBLEM FOR ADULTS, TOO?

The answer to this question lies in the birds' feeding behavior, which I've been studying since the mid-1980s. Most other wading birds feed in the brackish-water marshes close to Pumpkinseed Island, but breeding White Ibises invariably fly long distances inland, sometimes as far as 50 miles, to find food for their offspring in freshwater marshes. Nestling ibises are almost always raised on diets of freshwater prey, most often crayfish, not on the fiddler crabs that are so abundant in the brackish marshes surrounding the colony site.

Why do ibises fly so far to get food for their young when there's plenty of food close at hand? In 1985 my colleague Jim Johnston and I tried to make sense of this paradox. We knew that ibises in coastal colonies lay significantly smaller clutches than ibises in inland colonies; our colleague, Jim Kushlan, had suggested that this was because of the physiological stress associated with marine ecosystems. So we decided to investigate salt content as a limiting factor in White Ibises' prey choices.

With field assistants Robin Hughes, Heidi Koefer, and John Edens, we hand-raised three groups of nestling White Ibises on three kinds of food. The first group received their normal diet, low-salt freshwater crayfish; the second group ate high-salt, brackish-water fiddler crabs; and the third group ate freshwater crayfish whose salt content had been artificially raised to equal that of fiddler crabs.

The results of this experiment were unequivocal. Nestlings on low-salt crayfish diets grew and developed normally, whereas birds on the two high-salt diets ate little of their food and began to lose weight. When we changed their diets to freshwater food, the nestlings began to feed themselves again and gained weight. Clearly, the parent ibises had a good reason for spending so much time and effort seeking freshwater prey for their young—they *had* to if they wanted their offspring to survive.

Subsequent studies at the colony site corroborated these laboratory findings. From 1985 to 1989 Jim Johnston, graduate student Toni De Santo, and I monitored more than 100 White Ibis nestlings being reared by their parents at Pumpkinseed Island, to see how slight changes in the salt content of their food affected the young birds' growth and development. On alternate days during the first two weeks after hatching, we weighed and measured individually marked nestlings. We also collected small amounts of food regurgitated by each bird's siblings and measured the food's salt content. Then we compared each bird's growth rate to the saltiness of its diet. We found that birds on slightly saltier diets grew slower and were less likely to survive to fledging than birds raised on low-salt diets.

But if salt is such a problem for ibis nestlings, why isn't it a problem for adults, too? How do the parents survive on a diet of high-salt fiddler crabs? Adult White Ibises have two things going for them that nestlings do not. First, they have a pair of fully developed, functional salt glands (located above their eyes) that concentrate and excrete excess salt. In young ibises, the developing salt glands are not yet able to process salt efficiently. Second, adult White Ibises can fly, so they can drink fresh water at nearby ponds. Confined to the nest, young ibises cannot.

Why don't adults ferry fresh water to their nestlings? After all, they do transport and regurgitate semisolid prey. The only explanation I can suggest is that perhaps adults can't carry water because it's more difficult than food to hold in the upper reaches of their digestive tracts.

Whatever the reason, the end result is the same. White Ibises that breed in coastal, brackish-water marshes can't feed their nestlings fiddler crabs. The extent to which these birds depend upon freshwater crayfish was revealed in an analysis Jim Johnston, Peter Frederick, Will Post, and I performed in 1989. Puzzled by fluctuations in the numbers of ibises breeding at Pumpkinseed Island in the 1970s and 1980s, we compared bird numbers to the amount of rainfall in the region during the six-month period prior to egg-laying. We knew that crayfish were more abundant in wet years than in dry years, and we wanted to see if ibises responded to an increase in food by breeding in higher numbers.

We found that the wetter the winter and spring, the larger the number of breeding White Ibises at Pumpkinseed. A second analysis linked the population data with nestling survival data that Toni De Santo helped us collect. Many more nestlings survived in years when many ibises bred than in years in which fewer birds bred. Presumably, when the birds first return to South Carolina in March, they "sample" the feeding grounds to measure how high the water is and how much food is available; they breed if conditions are favorable. Still, water levels and hence prey availability can change substantially over the course of the breeding season. So the exact details of how White Ibises manage to predict their chances of successful breeding remain a mystery.

Given what we know about the food requirements of breeding ibises, why did they vanish from Pumpkinseed Island in 1990? Could it be because of Hurricane Hugo, the disastrous tropical storm that struck the South Carolina coast in late September of 1989?

Hurricanes hit South Carolina fairly often—the region is visited by such gales once every two or three years—but catastrophes of Hugo's magnitude are far less frequent. Hugo caused more than $6 billion in property damage and killed 35 people in South Carolina alone. The storm's ecological impact was similarly enormous. Hurricane Hugo flattened more timber than did Hurricane Frederick, Hurricane Camille, the Mount Saint Helens volcanic eruption, and the Yellowstone National Park fires of 1988 combined.

Still, the Pumpkinseed Island colony site and the salt marshes encircling it actually experienced little storm damage. So why didn't the ibises breed there?

Hugo's effects on the ibises were indirect. The nearby upland and freshwater marshes were severely affected, not only by the hurricane-force winds, but by a 12-foot storm surge that barreled over the region, pushing a wall of ocean-strength salt water as far as three miles inland. Many of the region's freshwater wetlands were flooded by the storm surge, and the toxic salt decimated most of the plant and animal life in the marshes.

The ecological enormity of the event was driven home to me in May 1990, when Jim Johnston and I spent several hours flying up and down the coast in a small plane in a futile and sobering effort to find our missing birds. The storm's impact on the region's freshwater

These ibis nestlings will be able to eat salty foods when they grow up. Right now, though, the glands that get rid of extra salt aren't fully developed, so the young birds need crayfish and other freshwater foods. When Hurricane Hugo pushed a wall of seawater three miles inland in 1990, it destroyed the marshes where adult birds get food for their offspring.

CHUCK DRESNER

wetlands was readily apparent, even from several thousand feet in the air. The brackish-water marshes were their normal verdant green, but the freshwater marshes and swamps showed the grays and browns of dead and dying vegetation, or in some instances the brilliant red of tremendous blooms of diatoms, microscopic algae that thrive in brackish water.

Certainly these were not the productive habitats the birds had left behind the previous August. In the spring after Hurricane Hugo crayfish populations at the freshwater swamp closest to the ibis colony had dropped to less than a quarter of their prestorm levels. The White Ibises that returned to Pumpkinseed Island in March and April of 1990 must have been overwhelmed. We saw birds circle the island several times to make sure the colony site was still there, then fly off in the direction of the traditional feeding grounds. Few were ever seen again. We presume that when the birds failed to find sufficient food, they moved on to other breeding sites.

Although we never saw more than 300 individuals at any one time that spring, we estimated that from March to April, thousands of White Ibises returned to the area, only to leave after they discovered the supply of crayfish was inadequate to feed their young.

Where these birds went after visiting Pumpkinseed is uncertain. Some may have traveled 100 miles farther up the coast to Battery Island, North Carolina—more than 6,000 White Ibises bred there in 1990. Others may have gone without breeding that year. One thing is certain. Pumpkinseed Island's White Ibises did not breed by the thousands elsewhere in South Carolina that year. Careful aerial surveys of the state failed to locate a single large colony.

The 550 White Ibises that eventually returned to breed at the site in 1991 offered hope for the future, even though they represented less than 10 percent of the island's typical ibis population. These birds managed to find enough crayfish to fledge several dozen nestlings. In the spring of 1992, 2,500 breeding pairs used the site. And by 1993, 4,100 pairs of ibises were raising young on Pumpkinseed Island. The region's breeding population of White Ibises appears to be closely tracking the local recovery of freshwater crayfish populations.

Although Hurricane Hugo was a ruinous event,

AERIAL PHOTO: KEITH BILDSTEIN

C. ALLAN MORGAN

To raise a family, White Ibises need both coastal "bedrooms," such as the 15-acre chunk of salt marsh that is Pumpkinseed Island, left, and inland "kitchens," like the freshwater marsh, above.

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Author Keith Bildstein has been studying White Ibises on Pumpkinseed Island for more than a decade. Above, he checks an ibis nest.

one I wish had never occurred, its impact on South Carolina's coastal wetlands provided a unique test of our ideas about White Ibises' dependence on freshwater prey. Hurricane Hugo didn't directly affect the birds themselves; it didn't even indirectly affect their colony site on Pumpkinseed Island. Instead, the hurricane temporarily destroyed the birds' largely unappreciated but equally essential inland feeding sites. As a result, the numbers of White Ibises breeding on Pumpkinseed Island plummeted from more than 11,000 pairs in 1989 to zero in 1990. Had it not been for our research, the extent to which Hurricane Hugo affected the breeding ecology of White Ibises might have gone unnoticed.

More importantly, our research offers an important lesson in conservation biology. Breeding populations of White Ibises need both coastal "bedrooms" and inland "kitchens" to survive—the two types of habitat are equally important for successful reproduction. Protecting the conspicuous coastal colony sites is not enough. The less-conspicuous but equally important inland feeding sites must also be protected.

To date, conservationists and coastal land managers have given inland sites considerably less attention than coastal sites. Many decision-makers remain oblivious to the ecological principal that coastal salt marshes and freshwater wetlands are interconnected.

In a sense, Hurricane Hugo was a landscape-scale natural experiment, one that documented the inextricable link between two very different types of habitats. By studying the storm's impact, we can better assess how similar large-scale, human-caused perturbations might affect coastal zone ecosystems.

Recent advances in our understanding of how coastal ecosystems function, together with an increasing appreciation of their value to humanity's own well-being, offer considerable hope for the future. Through their use of both brackish and freshwater wetlands, Pumpkinseed Island's White Ibises are signaling to us about our needs as well as theirs. ■

Keith L. Bildstein is director of research at Hawk Mountain Sanctuary in Kempton, Pennsylvania, where he oversees Hawks Aloft Worldwide, a conservation initiative that protects migrating raptors. He is also a research fellow at the University of South Carolina's Belle W. Baruch Institute for Marine Biology and Coastal Research. His recent book, White Ibis: Wetland Wanderer *(Smithsonian Institution Press; 1993), provides a popular account of his 14 years of research on ibises.*

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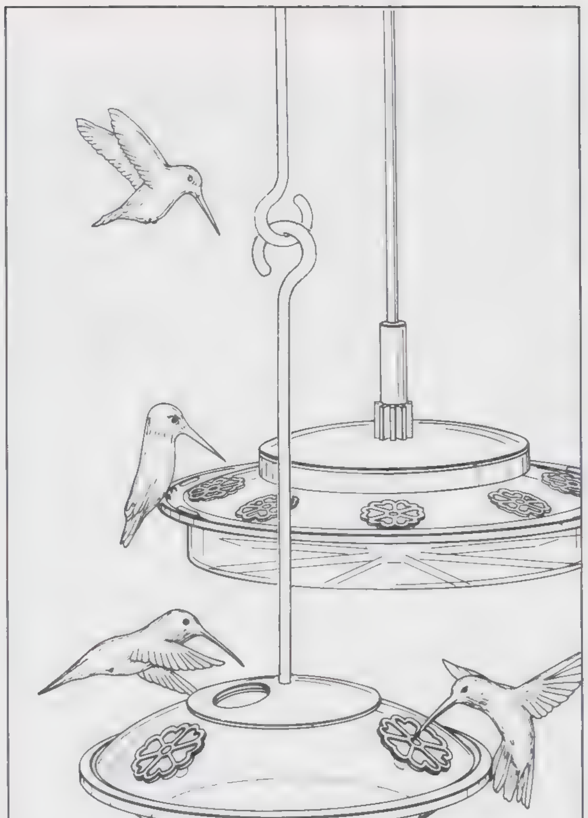

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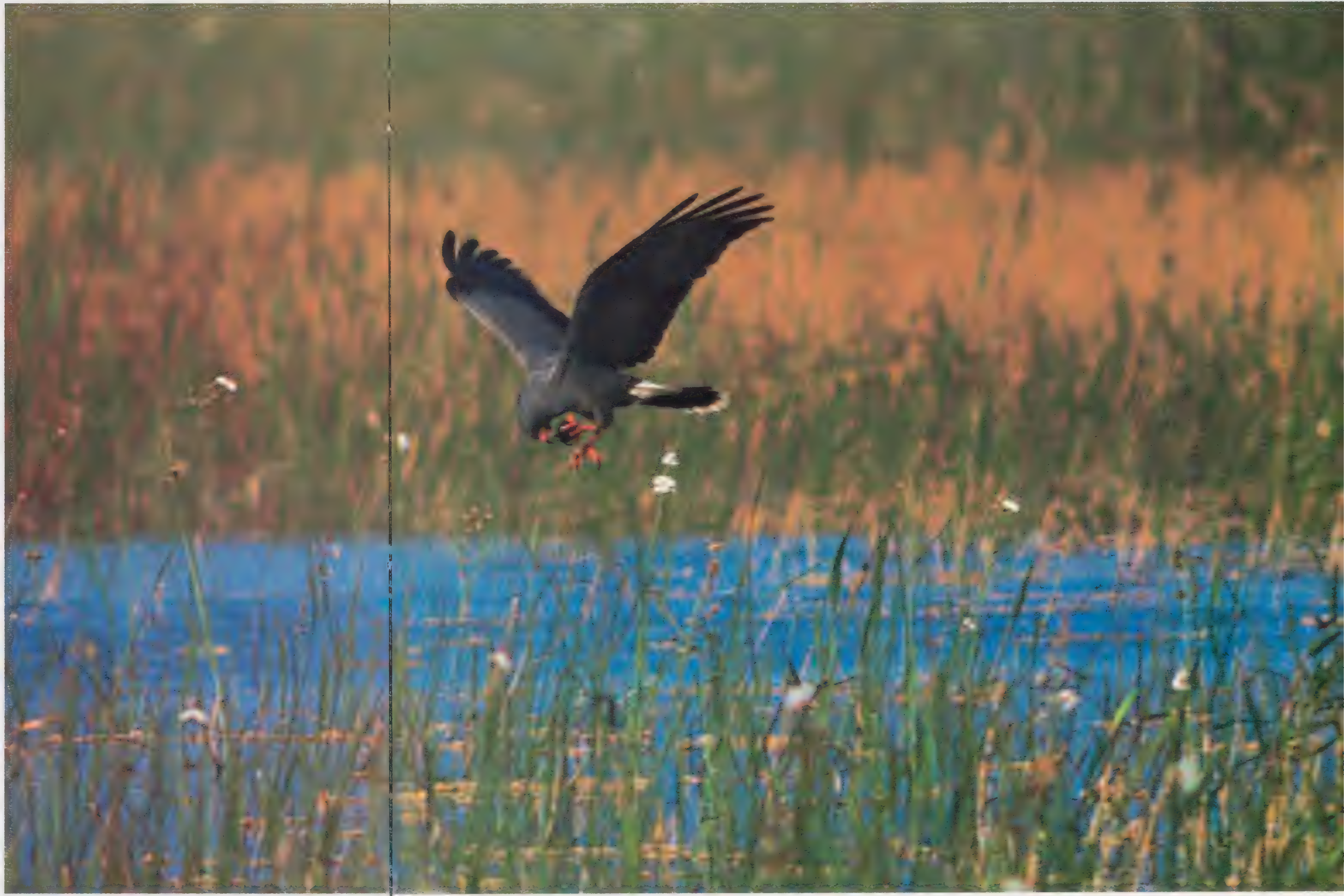

After deftly plucking an apple snail from just below the water's surface, an adult male Snail Kite hangs in the wind, transferring his catch from foot to bill.

THE FATES OF FLORIDA'S ENDANGERED SNAIL KITE AND ITS EVERGLADES HOME ARE INEXTRICABLY LINKED

Roaming South Florida in an airboat, 15 miles from the nearest road, I feel like I'm riding behind a combine in a Kansas wheat field. Broken cattails and sawgrass spray in my face—chaff of the Everglades. Spiders, dragonflies, and beetles pummel me. The boat begins to look like a mobile muskrat house. We stop, wedged in tall, spiky sawgrass, and the world resolves into peace. From where I sit, wild Florida now appears untroubled, unhurried, in a state of seamless grace. Except for the jets that scar the blue and white January sky on their way to Miami International Airport, it's easy to forget what century I'm in. Time and thoughts lapse as the day peels away. A Limpkin wails, wild, weird, eternally sad. I'm here to see Snail Kites and I'm not disappointed.

A steel gray male labors into the wind, head down, peering for apple snails. Spotting one, he hovers, his

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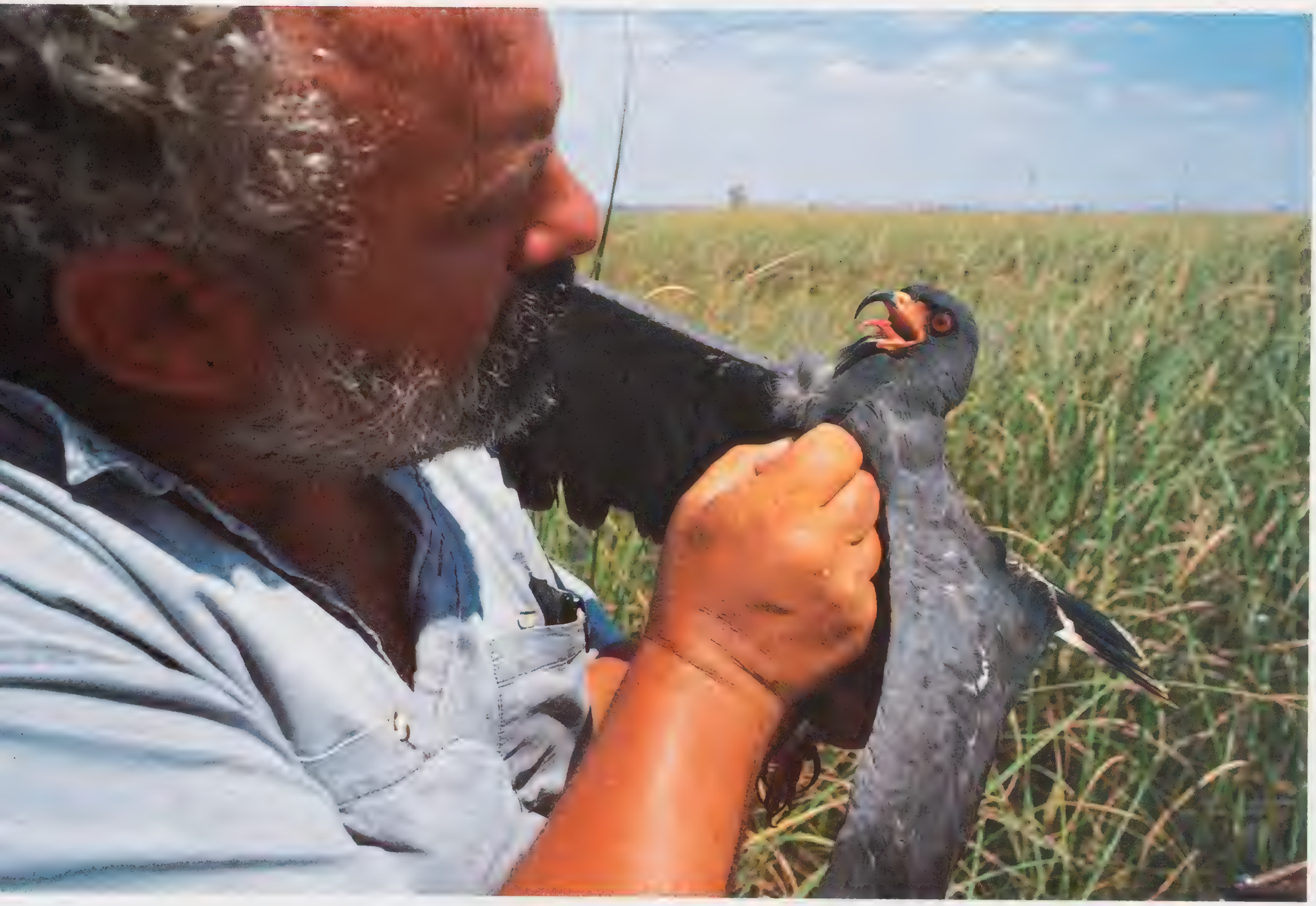


Biologist Rob Bennetts checks the fit of a newly installed radio transmitter before releasing an adult male Snail Kite. These tiny transmitters lie flat on the backs of the kites, held in place by a thin harness of Teflon ribbon. The birds preen the ribbon under their feathers within a few hours after they are released. Tracking the birds by radio is the best way to unravel the mysteries of kite dispersal and mortality.

banded tail teasing the wind. He stoops, a tentative dip, rises, stoops again, and then delicately plucks a snail from just below the surface, barely wetting his toes. Rising, the kite transfers his prize from foot to bill, turns into the wind, and disappears into a willow head rife with Anhingas, ibises, and sundry herons.

I am the guest of Rob Bennetts, 41, a biologist who began studying Snail Kites here in 1986. I sit in his airboat, a shallow, rectangular aluminum vehicle that resembles an oversized paint pan. We pause 100 yards from a communal kite roost. I've seen 14 Snail Kites today, the most I've ever seen.

Snail Kites are loosely communal, which accounts in part for their scientific name, *Rostrhamus sociabilis*—"hooked beaked, gregarious." I count 11 birds in and around the roost. Last November Rob had 332 kites in one willow head not far from where we now sit, and he has recorded nests as close to each other as six feet, though most are aggregated within 400 feet.

Rob Bennetts's mahogany-tanned face emerges from a wrap of curly black hair and beard. For a large man, he possesses uncommon stamina, wolf endurance. He often toils from before sunrise to well after dark, on the computer, in the field, and on the telephone. Engineers, water managers, biologists, administrators, newspaper reporters, and park service naturalists leave messages on his answering machine, wanting his advice, his opinion, and his time. Rob is an eloquent ambassador for the Everglades and Snail Kites, and also for the Florida Cooperative Fish and Wildlife Research Unit, his employer. These birds and their ailing landscape are his family, and a more devoted advocate neither one could find.

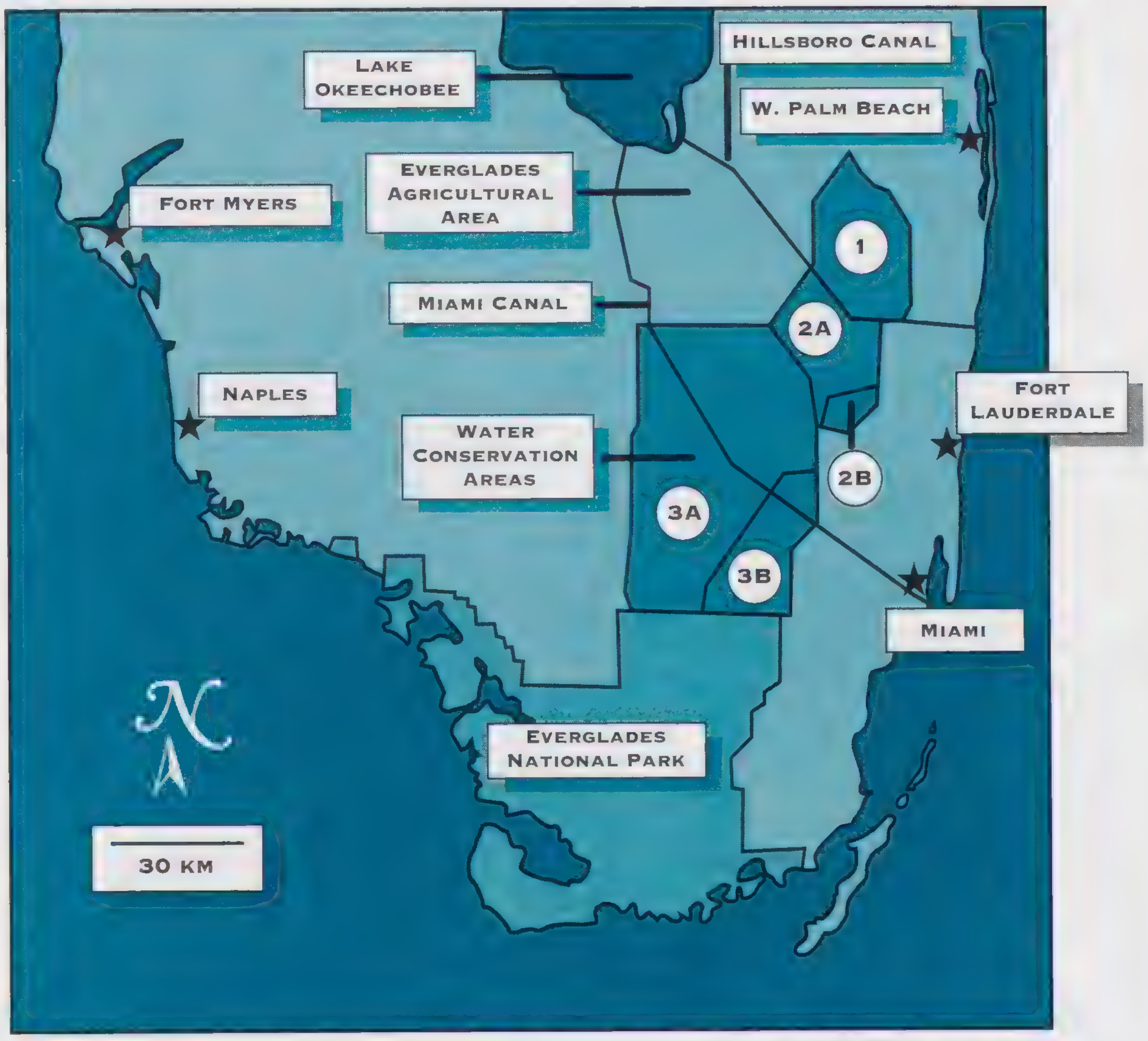
Rob is here to catch and radio-tag a kite using a specially designed net gun. Like the man, the gun is big, and in his hands looks like a space-age blunderbuss. The gun fires a 10-foot triangular nylon net fixed to three padded projectiles, using three .22 caliber blanks to propel the net.

Snail Kites are nomadic. Unlike many species of hawks, which may use the same nest site for years, the kites do not have a strong attachment to a particular breeding area. According to Rob, Florida's entire population of Snail Kites, which extended throughout the state prior to the debasement of the wetlands, is one large unit that now depends on a much reduced network of habitats in Central and South Florida. The number of birds in each subpopulation fluctuates according to local conditions that influence the availability of snails. Individual habitats within the network blink on and off for the birds, and they head for whichever area has the most snails during a given period. During the late 1960s Water Conservation Area 2A blinked on, followed in the early 1970s by Arthur A. Marshall Loxahatchee National Wildlife Refuge. Water Conservation Area 3A shone constantly from the mid-1970s to 1993. And this year Water Conservation Area 2B blinked on. When an area within the network begins to dim, a few kites may continue to eke out a living, perhaps skipping a breeding season; the rest either disperse or perish. Hence the distribution of Snail Kites is dynamic, booming and busting like the Everglades itself.

The Everglades is a mega-marsh where drought is both common and crucial—the seeds of cypress trees and sawgrass, for example, only germinate on dry land, even though the parent plant survives wet periods of nine or ten months. The issue is not whether an area will be dry, but when and for how long. Since Snail Kites depend on apple snails, which in turn depend on long wet periods, Rob explains, the birds have adapted a strategy: they maintain one contiguous population that shifts constantly to areas of deep water. Everywhere else in this species' range—in Central and South America—the wet and dry cycles are more predictable and so, presumably, is the kites' behavior. But here at the northern edge of their distribution, they pay homage to a fickle habitat: the Everglades.

An alternate view held by several biologists is that Florida Snail Kites use a series of primary habitats. During severe droughts the birds move to secondary habitats called refugia, where snails are available but limited. Once the drought ends, surviving kites return to their primary habitats. Taking this notion one step further, federal wildlife managers assumed that if primary habitat were permanently inundated kites would be favored. But subsequent research in Water Conservation Area 3A has shown that prolonged inundation alters the aquatic communities; bay heads give way to willow heads and eventually willow heads phase out. *Sagittaria* and sawgrass, the emergent marshland plants upon which snails crawl out of the water to attach their clusters of round, white, BB-sized eggs, yield to floating plants. And whatever affects snails directly affects the kites.

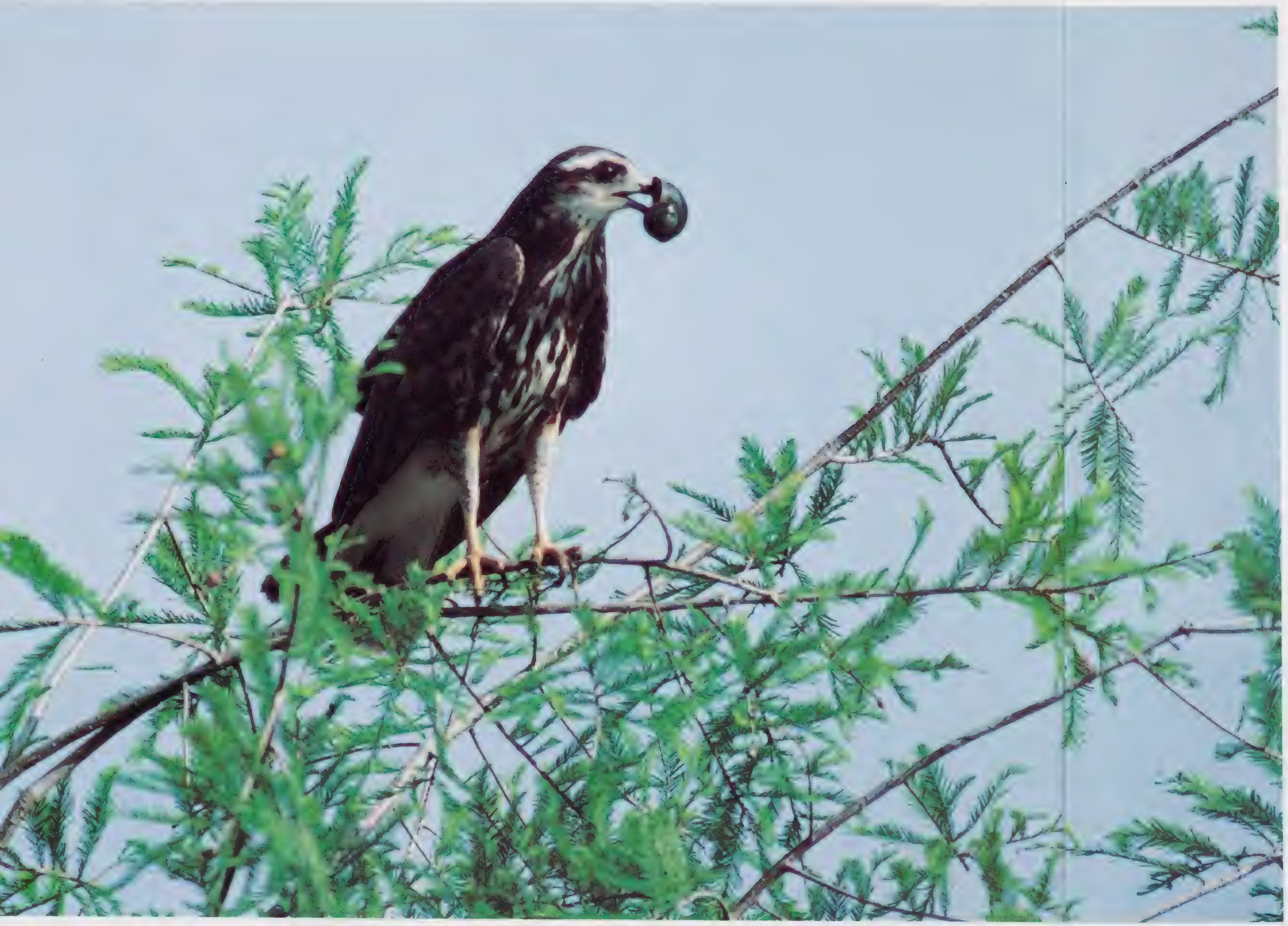
Since the U.S. Army Corps of Engineers completed its elaborate levee system in 1962, water deliveries to Everglades National Park have been either too little or too much, and often at the wrong time. The short hydroperiod marshes adjacent to the Everglades, once an important foraging site for wading birds at the beginning of the dry season, baked to a mocha-colored mud. Floodgates were opened at the wrong time of year. The park's wading bird colonies, which were impeccably tied to the natural rhythms of wet and dry cycles, crashed. White Ibises began nesting in South Carolina and Louisiana; egrets and herons shifted their rookeries from estuarian mangroves to willow and cypress heads in the central and northern Everglades. The population of Wood Storks, whose impulse to breed is cued by concentrations of fish corralled by drought, collapsed from 4,000 in 1930 to less than 100 in 1990, and eventually they joined the kites on the Endangered Species List. Wood Storks are seasonally drought-dependent. Snail Kites are flood-dependent. Only a capricious wetlands, a wetlands enriched by yearly cycles of wet and dry, punctuated by violent drought and alarming flood—an Everglades—could accommodate both species.



When the Corps of Engineers developed four alternative models to help restore historic water distribution patterns to the Everglades National Park, a small war between government agencies began. Snail Kites lay at

The kites maintain one contiguous population that moves constantly to snail-rich areas. Water Conservation Area 2A, see map above, was excellent for snails and kites during the late 1960s; but from the mid-1970s to 1993, the kites stayed in Water Conservation Area 3A. And now they've moved to 2B, which currently has the best conditions for snails.

HERBERT CLARKE



A Snail Kite's long hooked bill is perfectly designed to probe inside a snail shell and extract the food inside. But such specialization carries a price: if the apple snail population in the Everglades crashes, Snail Kite numbers will also plummet.

the heart of the controversy. The following four proposals were discussed: 1) *base*—the do-nothing approach; 2) *modified minimum delivery*—remove the parallel levees in Water Conservation Area 3A, which would keep four square miles in the southeast corner of 3A under water, even during severe droughts; 3) *basic rain-driven*—remove the parallel levees as in the second proposal, but also install pumps to spread water from Water Conservation Area 3A to 3B south through the Shark River Slough, restoring a natural sheet flow of water to the park; and 4) *modified rain-driven*—similar to the rain-driven plan, except that during drought years a square-mile pool of water would be maintained in 3A as a refugia for kites.

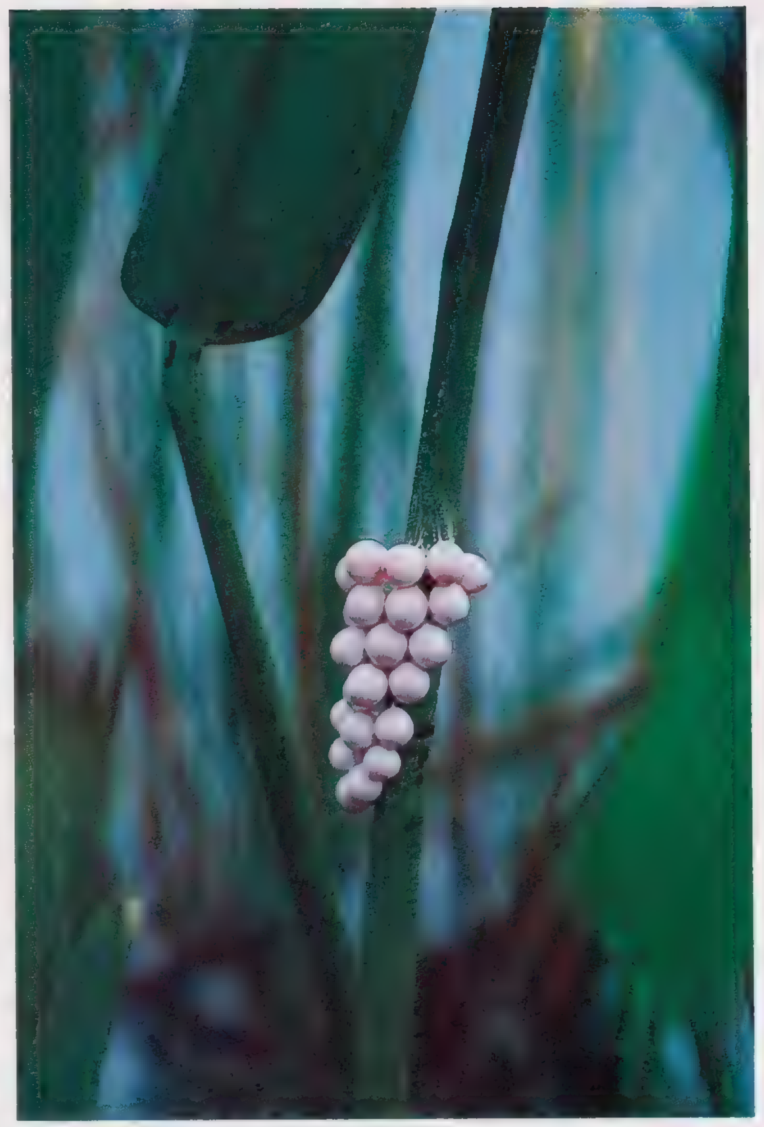
Influenced by the notion of primary habitats, the U.S. Fish and Wildlife Service (USFWS)—the government agency legally mandated to protect the critical habitat for endangered species—favored the modified rain-driven plan. After a series of meetings with biologists and hydrologists from the South Florida Water Management District, the USFWS, and the National Park Service (NPS), however, the Corps of Engineers settled on the third proposal, the basic rain-driven plan.

In response, the USFWS issued a jeopardy opinion against the plan. According to the agency, restoring a sheet flow to the Shark River Slough would adversely affect the southern part of Water Conservation Area 3A as a kite refugia. For a brief, ugly moment the USFWS squared off against the NPS, its sister agency in the Department of the Interior. The NPS—whose mandate is to preserve the integrity of whole ecosystems—lobbied for a natural water distribution regime, a system driven by rain.

In an effort to sidestep the USFWS's jeopardy opinion, the NPS unsuccessfully attempted to draft legislation that would have exempted Everglades restoration from the Endangered Species Act. "People are always afraid of extremes; they always look for an annual mean," says John Ogden, an Everglades National Park biologist who has studied Wood Storks for 20 years. "But in nature that mean can only be found over a number of years. I say let things run amok." Rob Bennetts, who was funded by the NPS and the USFWS to settle the speculative ideas about what influences Snail Kite dispersal and mortality, agrees. The so called "primary areas" are not permanent; they rotate throughout the marshlands of Central and South Florida as the availability of snails changes, he says. Thanks to his work, the disagreement between the agencies has been resolved and the kites are no longer a major factor in determining which water distribution plan to follow.

Snail Kites are feathered contradictions, expressions of the meteorological whims of South Florida. Who could dream up a more unusual and precise system, whose very balance hinges on wide-scale disruption—a triumph of illusion, oscillation, and contradiction?

We leave Rob's cramped trailer for Lake Okeechobee before sunrise and drive across the rangeland east of Immokalee. After reaching the lake, we launch the airboat from Moore Haven's public ramp. By my home state Vermont's standards, Okeechobee is too shallow to be a lake and too big to be a pond. It is a shallow, saucer-shaped, 800-square-mile incubator, reputed to grow the heaviest bass, the longest alligators, and the foulest weather in Florida. From the airboat I can't tell where the marsh ends and the open water begins. Before the Corps of Engineers built Hoover Dike in 1930, Lake Okeechobee overflowed into the northern Everglades whenever the lake rose 18 feet above sea level. Water seeped south down an elevation gradient of less than two inches per mile.



Apple snails attach their clusters of white, BB-sized eggs to the stalks of emergent marshland plants, above right. In areas where these plants are replaced by floating vegetation, the numbers of snails and kites goes down.

We lose our way momentarily in some dense stands of phragmites and cattails that have proliferated since Rob's last visit, crowding out rushes and arrowhead and filling in open water. The airboat is gripped by cattails 10 feet tall, mounds of last year's growth. "This is nothing," says Bennetts, grinning. We rock the boat to the left and right, hacking at the brittle stalks. Moorhens skitter out of our way.

According to Rob, runoff from agricultural lands is the source of the phosphorous pollution that favors cattails. He's noticed a curious lag phase that may actually aid apple snails at the onset of the nutrient overload. "Based on egg clusters, based on distribution of kites and other snail-eating birds, *Sagittaria* appears to be very good habitat for snails," he says. "There is an early phase, a transition of the nutrient overload that favors blooms of *Sagittaria,* that in turn favors apple snails. Kites have good foraging, but it's short-lived. Eventually cattails spread at the expense of everything else."

We mark four kite nests, three in willow, one in buttonbush. An unbanded female, a bird of unknown age and origin, sits on a willow snag, calling in defense of her nest: *ka, ka, ka, ka, ka, ka.* Rob fires the blunderbuss. Just as the bird takes off, the net hangs her in the willow, upside down and angry. Deftly, Rob untangles her and hands her to me. I place the kite headfirst into a cut-away, two-liter plastic Pepsi container, which holds the bird gently but securely, preventing her from injuring herself. Rob weighs her: 428 grams; slightly less than a pound. She puts up little resistance as he first rings one leg with an

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aluminum USFWS band and then the other with a black plastic band.

Rob carefully dresses the kite with a tiny radio transmitter attached to a harness, slipping a loop of thin Teflon ribbon over her head and under her wings. He ties it off, checks the fit, then glues the knot, placing tiny cardboard wedges between her feathers and the glued knots until they dry. Ten minutes later we release her. The radio transmitter and antenna lie flat on her back. Within a few hours she'll preen the ribbon under her feathers.

> SNAIL KITES ARE THE ONLY KNOWN POLYGAMOUS BIRD SPECIES IN WHICH EITHER SEX MAY ABANDON ONE FAMILY AND START ANOTHER

Snail Kites have an unusually high reproductive potential for a hawk. Some birds breed as yearlings; some produce two broods in a bountiful snail year. It's to their advantage to be fruitful and multiply because the periodic droughts are devastating—more than 80 percent of all kite nests on average fail to produce young during droughts. During wet years, three to five weeks after hatching—when the young are nearly full grown—one parent may desert the family, choose another mate, and nest again; an odd behavior known to ornithologists as ambisexual mate desertion. The forsaken parent then raises the young alone. Snail Kites are the only known polygamous bird species in which either sex may abandon one family and start another. According to kite biologist Steve Beissinger, who first reported this unusual behavior, the single parent families usually succeed. From an evolutionary standpoint, ambisexual mate desertion maximizes the birds' opportunity to produce young during a wet year.

Rob hopes to radio-tag 100 birds this year. He needs a sample large enough to help unravel the mysteries of kite dispersal and mortality. No one has radio-tagged more Snail Kites than Rob Bennetts. Adult birds, though harder to catch, are the most important parameter in a survival study, he tells me. I ask him what, besides drought, kills a kite? A week ago he found the head and feathers of an adult female in a nest, probably the work of a Great Horned Owl. Last year an acquaintance of Rob's startled a water moccasin just as it was swallowing a nearly full-grown chick. Yellow rat snakes eat both eggs and chicks. So do Boat-tailed Grackles, which often nest in the midst of a kite colony. Black-crowned Night-Herons, Northern Harriers, and Red-shouldered Hawks are also potential predators. Kites nest over water, which keeps marauding raccoons and opossums at bay; these bite-sized animals usually avoid alligator-infested waters.

An adult Snail Kite's eyes are metallic, two-toned red, the color of blood in the center, radiating outward in points and spears into a pink base, like a frozen kaleidoscopic image. They are eyes irrevocably tied to the fortunes of Everglades restoration. Rob believes that Snail Kites will be monitored long after he leaves the Everglades. They're a barometer of the region's health, an unalloyed product of South Florida's ecological integrity. Since Wood Storks breed in northern Florida and Georgia and White Ibises breed in South Carolina and Louisiana, they're influenced by factors outside of South Florida's suite of ecosystems. But win, lose, or draw, the North American population of Snail Kites is Everglades dependent. ■

Ted Levin is a freelance author and photographer based in Thetford, Vermont. His latest book, Blood Brook: A Naturalist's Home Ground, *was published in 1992. He is currently working on a personal natural history of subtropical Florida.*

Snail Kites have an unusual nesting strategy. To make up for a nest failure rate of 80 percent or higher during drought years, the birds become polygamous when conditions are good and produce a bumper crop of young birds. At right, the hope for the future—a new generation of Snail Kites.

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Their Status and Distribution

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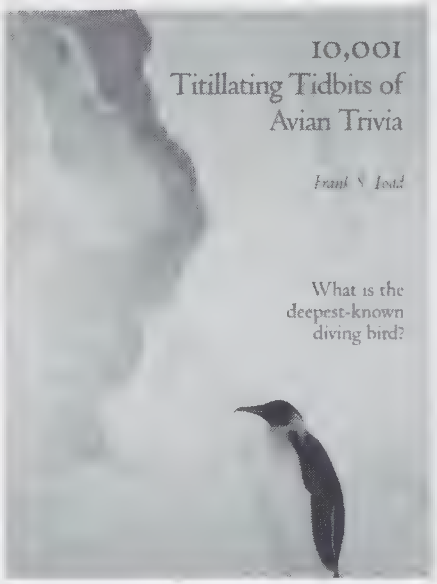

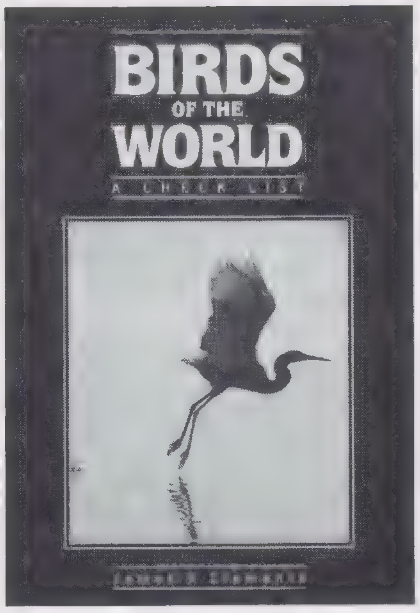

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WHAT'S IN A NAME?

by R. Tod Highsmith

A taxonomic tidal wave is building on the ornithological horizon. It's a periodic event, occurring every decade or so, but the avian world as we know it may never be the same. Prepare to see familiar species of birds washed away before your eyes and new ones left in their wake. Past waves have transformed gallinules into moorhens, metamorphosed Marsh Hawks into harriers, and left behind a single oriole where once there were two.

What earthly force triggers these upheavals? Earthquakes? El Niño? No. The culprit is the seven-member Committee on Classification and Nomenclature of the American Ornithologists' Union (AOU). Every 10 to 20 years, this august group publishes a new edition of the *Check-List of North American Birds*, the authoritative summary of "our most reliable information on systematic relationships among birds," according to Richard Banks of the National Museum of Natural History, the group's current chairman. Flip open the *Check-List* and you'll find a detailed accounting of the more than 2,000 species that occur regularly (and irregularly) from northern Canada to southern Panama, presented in a way that reflects our present understanding of their ancestry and relatedness. You'll also find what the committee, the supreme arbiter in such matters, deems to be

CRAIG MOKMA

In the last 12 years, the species above has changed from Green Heron to Green-backed Heron and back again. What other changes lie ahead?

JUST WHEN YOU THOUGHT YOUR LIFE-LIST WAS SAFE, THE AOU IS PLAYING THE NAME GAME AGAIN

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the correct common and scientific names of all birds under their purview.

The seventh edition of the *Check-List* is due to be published by the end of 1995, but some bird watchers are still recovering from the last major revision, which appeared in 1983. That was the tidal wave that swept away the Common Gallinule and Marsh Hawk, only to rechristen them as Common Moorhen and Northern Harrier. Just a decade earlier, the richly plumaged Baltimore and Bullock's Orioles were stripped of their names—so full of geographic and historic allusion—and were lumped into a single species called the Northern Oriole.

> WHAT'S THE DIFFERENCE IF YOU CALL THEM BLACK-SHOULDERED KITES OR WHITE-TAILED KITES? THEY STILL HAVE BLACK SHOULDERS AND WHITE TAILS.

These were not the only species a generation of birders had to unlearn. The stately Whistling Swan was recast as Tundra Swan. "Swans were hard enough to tell apart in the field when they were Whistling and Trumpeter," complains a birding friend. "Now that they're Tundra and Trumpeter, even their names sound alike." And the Green Heron, familiar denizen of ponds and marshes, inexplicably became Green-backed Heron overnight. This so incensed an editor of *Audubon* magazine, he editorialized that "the AOU can go soak its head."

Carping about bird names is hardly a recent development; in fact, it's a time-honored tradition. In 1880, several years before the first AOU *Check-List*, ornithologist Robert Ridgway published a seething diatribe entitled "On Current Objectionable Names of North American Birds." Ridgway targeted his rage at a list of "glaringly false" scientific names, those tongue-twisting Latin and Greek binomials that most birders never even bother to learn. The scientific name of the Red-cockaded Woodpecker (*Picoides borealis*) is all wrong, he explained, because *borealis* means "of the north" and the Red-cockaded is "the most southern of all the Woodpeckers occurring east of the Mississippi." The Latin moniker of the Chimney Swift (*Chaetura pelagica*), he chided, suggests a pelagic, open ocean habitat, "but who ever heard of the Chimney Swift occurring at sea except when driven there by a gale?"

If anything, bird names were more hotly debated in Ridgway's day than they are now. Several rival check-lists of North American birds were in use at the time, each assembled by an eminent authority and each with its own panoply of zealous adherents. A newly formed AOU tried to forge a truce when, in 1886, it amalgamated these into a single, official list. "The first *Check-List* was actually more than a check-list, it was one of the very first codes of zoological nomenclature," explains Richard Banks. In other words, the pioneer check-list committee did more than just inventory birds, they drafted a set of rules for naming them.

Any honeymoon the first *Check-List* spawned was short-lived—an amended edition appeared in 1895. By 1903, the AOU's founding president, Joel Allen, was complaining, "There has been so much discontent expressed over the constant changes that it is perhaps proper to consider for a moment whether it is really worthwhile to try to have an up to-date Check-list of North American birds." The situation on the international front was also far from rosy. The elders of the British Ornithological Union (BOU), the AOU's spiritual parent, had been busy naming their own birds for quite some time, and they thought the Americans had got their rules all wrong. As a reviewer in the BOU's *Ibis*, the premier bird journal of the time, haughtily commented: "We will merely express our regret that this proceeding disposes of the last chance of a scientific language in common with our ornithological brethren across the water."

Perhaps reflecting its rocky beginnings, today's *Check-List* remains a constantly evolving source of controversy. A little revolution every decade or so, in the form of a revised edition, is considered not only healthy but necessary. "Our understanding of the biology of birds continues to evolve, and taxonomies are always subject to modification as we learn more," says committee member John Fitzpatrick of Florida's Archbold Biological Station. Ornithology is in an exploding period, he explains, due to better information on species distributions and data from new techniques that let us read a bird's pedigree from DNA and other biochemical markers. "A static *Check-List* would give the absurd impression that we think we know everything," he says.

To prepare yourself psychologically for the changes coming in the new *Check-List*, it will help to understand why species are added to, or deleted from, the list and why their names are sometimes changed. A species usually earns a berth on the list in one of three ways. Many make the list through range expansion: they wander or are deliberately introduced into the *Check-List* area from somewhere else. Vagrants from far-off lands account for the great bulk of all new additions. First-time sightings of species such as the Yellow-legged Gull from Europe and Asia or the Azure Gallinule from South America may delight birders, but these

WHITE-TAILED KITE BY DAVID WELLING

GARY R. ZAHM

rarities are unlikely to become numerically important members of our regional avifauna. Other newcomers expand their range with human help; the Himalayan Snowcock is a “forced” wanderer, brought to Nevada’s Ruby Mountains to provide a game species for sportsmen. AOU rules grant introduced species official status if they persist for at least 10 years and establish self-sustaining populations.

Another major way to get on the *Check-List* is to be a North American native. You might think that the AOU must have cataloged all native birds long ago, but a surprising number of “stealth” species continue to be found. The White-fronted Swift and Elfin Woods Warbler, for example, are the kinds of outright new discoveries that every ornithologist dreams of making. Tiny populations of these birds lay hidden in remote corners of Mexico and Puerto Rico, respectively, until field workers stumbled upon them. Finds like these, however, are now exceedingly rare. “It still happens every few years in South America,” says John Fitzpatrick, “but in the *Check-List* area it’s a safe bet there are no more to find. And if I’m wrong, I’m wrong by one or two species.”

A third source of new native species lies right under our noses, when two or more new species are found lurking inside one old one. The check-list committee was long suspicious that this was the case with an Arctic-nesting shorebird, the Lesser Golden-Plover, because of the nature and extent of variability among individuals in parts of its Alaskan range. Recent field studies have confirmed two distinct breeding populations, distinguished by minute differences in plumage and vocalizations. Accordingly, the AOU now recognizes two separate species, the American Golden-Plover and the Pacific Golden-Plover. The birds got brand new common names to reflect the new thinking about their identities, and birders got a potential new prize for their life lists.

The tidal wave of name changes that struck in 1983 washed away the Marsh Hawk and left the Northern Harrier, above, in its place.

Avid listers will rejoice to know that additional new species may soon be split from the Scrub Jay, Gray-cheeked Thrush, and Red Crossbill, among others. These potential changes force us to look at some old, familiar species with new respect, according to Kevin McGowan, Curator of Birds and Mammals at Cornell University. “If the Warbling Vireo is eventually split into two or more species, as some are suggesting, birders are suddenly going to pay a lot more attention to one of the drabbest birds in the world,” says McGowan.

> THERE IS MUCH GOOD LITERATURE IN THE CHECK-LIST. FOR THE RIGHT READER, AND AT THE RIGHT TIME, ITS BRIEFEST PROSE MAY TURN TO POETRY.

Of course, the hand that giveth can also taketh away. Such is the case with the Baltimore and Bullock’s Orioles, lumped together by the AOU in 1973 because they seemed to hybridize freely (something “good” species aren’t supposed to do) where their ranges overlap in the Great Plains. The original forms were demoted to subspecies and the name Northern Oriole was adopted to distinguish the lone new species from the ranks of more southerly orioles. Even the nonbirding public fumed about losing these popular birds; ironically, committee members may soon be eating crow in light of new data that suggest the two races should indeed be split into two species.

In situations where a bird’s name is altered, but not its taxonomic status, there is no net gain or loss to the *Check-List*. Some changes represent an attempt to standardize the common names of species that have international or global distributions, so that, as Richard Banks explains, “wherever people speak English we’ll all be referring to the same thing.” This is the strategy behind the selective adoption of British terms such as moorhen for gallinule and harrier for Marsh Hawk, a practice that some critics feel has been too idiosyncratically applied. John Fitzpatrick puts it diplomatically. “The changing of common names has a checkered history. The check-list committee is searching for uniformity on this issue.”

With so many kinds of changes made in the *Check-List*, the occasional error or misjudgment is bound to occur. Happily, the committee is not loathe to correct itself. The lamented Green Heron, renamed “Green-backed” when it was erroneously merged with a South American species, was reinstated in 1993. Also granted a reprieve was the White-tailed Kite, which was mistakenly lumped with Old World relatives under the name Black-shouldered Kite. (“What’s the difference?” my birding friend asks. “They still have black shoulders and white tails.”)

Resist the urge to condemn the committee for these flip-flops. Theirs is a truly monumental task, that of forcing the latest findings in ornithology through a sieve of nomenclatural codes and taxonomic rules. Birders who feel overwhelmed by it all should take solace in the fact that, so far as we know, the birds don’t even notice when we change their names. Feathered nature proceeds apace, happily ignorant of our check-lists and field guides. My advice is to follow suit; keep a firm focus on the exquisite plumages, the lilting songs, and the curious habits of these splendid creatures, but let our artificial labels slide away whenever they temper your enjoyment. Remember that you love the birds, not their names.

At the same time, don’t eschew the *Check-List* as a tool, or even as a source of light entertainment. Heed the words of turn-of-the-century nature writer Bradford Torrey, surely the *Check-List*’s most unabashedly affectionate commentator, who penned a sort of love poem to the AOU’s 1910 edition. “Take down the *Check-List* and open it randomly,” he commands. “You are pretty sure to strike something worthwhile.” Torrey finds wonderful facts. Did you know that the first named specimen of the American Bittern was a vagrant collected in Piddletown, England? He finds that the Greek binomial of the Belted Kingfisher (*Ceryle alcyon*) “falls from the tongue like music.” The Black-throated Green Warbler’s name recalls to him “the very clump of evergreens” where he first saw the species. “There is much good literature in the *Check-List*,” insists Torrey. “For the right reader, and at the right time, its briefest prose may turn to poetry.” ■

Tod Highsmith is a freelance science writer who specializes in birds and conservation issues and enjoys exploring the history of ornithology.

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THE LONG AND SHORT OF CAMERA LENSES

Text and photographs by Tim Gallagher

Basic lenses for bird photography

One thing you find out quickly when you take up wildlife photography is how inadequate a 50mm lens is for taking pictures of birds. I learned that lesson as a teenager when I bought my first 35mm Single-Lens-Reflex (SLR) camera—a used Nikon F. Up to that time, I'd been lugging around a massive 4x5 press camera that my high school photography teacher checked out to students. I'd taken a few pictures of nesting hawks and eagles with it, but it was much too heavy and awkward to be a good bird camera. I figured the Nikon would solve all my problems.

Unfortunately, the only lens I had was the 50mm "normal" lens that came with my camera. I remember spending one long summer afternoon crawling around on my belly after robins in my front yard. The light was great and the birds were cooperative. I shot frame after frame of the birds foraging for worms, calling, and interacting with each other. I sent the film to a lab and anxiously checked the mail every day to see if my slides had arrived. When they finally came, I rushed to my room and started looking at them one by one in a battery-powered slide viewer. What a disappointment. The robins were minuscule in my slides, like little red dots on a green carpet. That's when I realized, to make those dots large enough I'd need heavier artillery.

In the years since, I've used a broad range of lenses, from wide-angle lenses for habitat shots to super-telephotos of 600mm or even 800mm to get close-up portraits of wary birds. Based on this experience, I have a good idea which lenses work best for bird photography in a variety of situations. If you're a beginner intent on eventually selling photographs to magazines and book publishers, I recommend starting with a top-quality 400mm f/5.6 telephoto lens, preferably made by the same manufacturer as your camera. A 400mm lens increases a bird's image size eight times—like looking through 8X binoculars—which is large enough if you get reasonably close to the bird you're photographing. For the best optical quality, look for a lens made with "ED" (Extra-low Dispersion) glass, which provides unsurpassed clarity and minimizes color fringing.

You may have heard people mention the "speed" of a lens. This term refers to the light-gathering ability of a given lens, which is determined by its maximum wide-open aperture setting—the smaller the f-stop number, the more light passes through your lens. Thus an f/4 lens lets in an entire f-stop more light than an f/5.6 lens, providing a brighter image in your viewfinder and allowing you to use a faster shutter speed to obtain the same exposure. Unfortunately, to achieve that added light-gathering ability, the manufacturer must use a larger front element on the lens, adding significantly to the size, weight, and price of a lens.

A good 400mm f/2.8 lens costs about $5,000—well more than twice the price of a 400mm f/5.6 lens, just to add

A 28-80mm zoom lens, used at its most wide-angle setting, captured the sweep and grandeur of this Prairie Falcon eyrie cliff . . .

two more f-stops of light. You'd have to sell quite a few bird images to make up that amount. If money, size, and weight are no object, then by all means go with the more expensive lens. But remember, you can take pictures just as well with the f/5.6 lens, provided that you learn to cope with its shortcomings.

The greatest problem with telephoto lenses is the way they intensify the effects of camera movement. Just as the extra magnification power of 10X binoculars makes them harder to hold steady than 7X binoculars, the more powerful a telephoto lens is, the more sensitive it is to the negative effects of camera movement. A photograph that would have been razor sharp taken with a 50mm lens might be blurred if you take it with a hand-held 400mm lens, even if you use the same shutter speed. A faster lens, such as the 400mm f/2.8, allows you to compensate somewhat for camera movement by using a faster shutterspeed to freeze the motion. But if you always use a solid tripod and take great care to keep your camera steady, you can get by with a slower lens.

Birders are always asking me whether they could take good pictures using a spotting scope as a camera lens. (Many optical product manufacturers sell camera adapters and encourage people to use their spotting scopes for photography.) Unfortunately, I have to answer no. A spotting scope is designed for looking at objects with your eye; adding a camera adapter will not turn it into an adequate photographic lens. For one thing, a scope is difficult to use as a camera lens, because there's no aperture control—you only have your camera's shutterspeed control to work with when you set the exposure. And worse, pictures taken through a spotting scope usually have serious vignetting, that is, the outer edges of the image are fuzzy and dark. If you want to take pictures that are good enough to be published or to project in a slide show, there's no substitute for a top-quality telephoto lens.

Another kind of lens that some photographers use is a mirror lens—a short, wide lens that uses a powerful curved mirror to magnify the image. They are compact, reasonably priced, often powerful—mirror lenses are usually 500mm, which translates to 10X—and can take sharp pictures, but they do have some drawbacks. For one thing, they're slow (usually f/8) and, like spotting scopes, they don't have adjustable apertures. And if the scene you're photographing has any bright spots of reflected light, they'll show up as white, doughnut-shaped halos. A picturesque lake glistening in the sunlight can end up looking like a bowl of shining Spaghettios. If your goals in photography are to document the rarities you see or to produce an occasional slide show for friends, a mirror lens may be adequate for your needs. But if you aspire to have your photographs published, buy a conventional telephoto lens.

Many people use teleconverters to boost the power of their lenses. These small attachments—available in 1.4X, 2X, and 3X—add an extra lens element between your camera and lens to increase magnification. On the down side, teleconverters reduce the amount of light reaching your film (a 3X teleconverter reduces the light by a full three f-stops) and often cause your pictures to be less sharp. The only teleconverter I use regularly is a 1.4X, which boosts the power of my lens by 40 percent while sacrificing just one f-stop of light.

. . . *but it took a 400mm lens with a 1.4X teleconverter, and a much closer vantage point, to get this shot of the adult female on a ledge.*

I always carry a couple of zoom lenses—a 28-80mm and an 80-200mm—in my camera bag to take pictures of habitat or groups of birds. Zoom lenses are great. They allow you to enlarge or reduce your image size without changing lenses or moving closer or farther away. I used to hate zoom lenses because they were never as sharp as fixed focal length lenses, but I've changed my mind. The top camera manufacturers now produce excellent zoom lenses. With these zoom lenses, a 400mm telephoto, and a dependable 35mm SLR camera, you'll have the basic tools you need to get started in bird photography. ■

FORMULA FOR A WHITE-WINGED TERN

by Pete Dunne

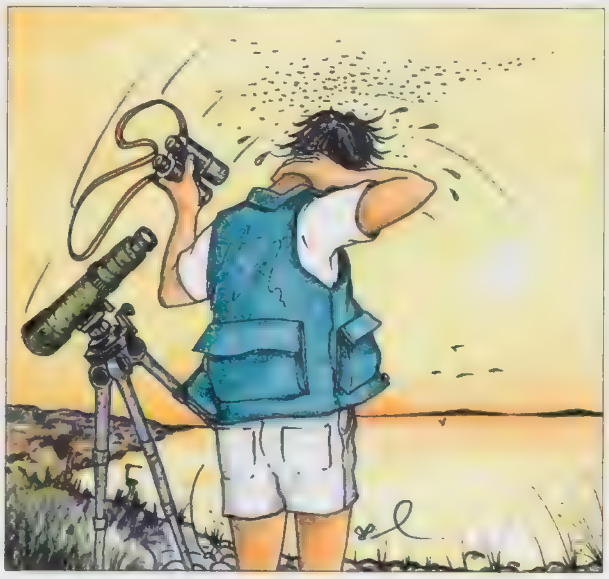
Seeing a White-winged Tern (Old World Marsh Tern, New World Waif) is not an easy matter—certainly not as easy as just heading for Delaware's coastal marshes in late July, scanning the flocks for *Chlidonias* terns, and picking out the one with the pale white rump. Oh no! Finding the White-winged Tern takes luck, skill, or perseverance, and usually all three.

But for White-winged Tern aspirants who are neither lucky, skilled, nor patient, there is another way to get the bird. It relies on a sure-fire formula; a set of conditions that once met virtually guarantees success. In fact, so foolproof is this formula that practitioners might just as well (and just as legitimately) simply check off the bird and stay home.

To get the White-winged Tern, pick a day when the temperature and the humidity make the air feel like soup and the only shade around lies beneath a cloud of mosquitoes. You must be sure to wear shorts, so as not to encumber the catalytic chomp of greenhead flies, and to leave your baseball cap in the car (next to your water bottle, insect repellent, and lunch) so the biting deerflies can inject madness into your method.

The choice of vantage points is critical. You must stand on the far side of the largest pool—as far from the flocks of feeding terns as you can possibly get and still count the bird in Delaware. Make sure that the sun is directly in your eyes. If you can see color or distinguish shape through the glare, move to a worse location.

It helps to have poor optics—binoculars so out of alignment that they would induce eyestrain in a potato and a spotting scope so internally fouled that the world looks like it's been lacquered with mustard. It also helps to have a field guide that assures that the bird is "unmistakable within range and habitat." (Since you will be relying on "jizz" to confirm your identification, you will certainly be within range; since you followed the directions given on the hotline, you will unquestionably be in the right habitat.)



It is also important to surround yourself with White-winged Tern aspirants who are as desperate for the bird as you are.

People who need it for their 700th North American life bird, or who are trying to break the Delaware Big Year record.

People who own $3,400 spotting scopes and talk about how they've seen *leucopterus* on three continents (yet never scan).

People who flew in from California, have searched for three futile days, and must fly out that night.

People who are "absolutely certain" that they saw the bird earlier in the day but who came back hoping for a "better look."

Saw it . . .

"Here?"

"Right here."

"Close?"

"As close as those birds are now. Close enough to count. But you know I'm the kind of birder who really likes to study my life birds, not just count them the way some people do. Know what I mean? That's why I came back hoping . . ."

It helps to have a number of birders present who still need Seaside Sparrow for a life bird (to help inflate the confidence levels of serious White-winged Tern aspirants). It is essential that Claudia Wilds of the American Birding Association *not* be present (so that serious White-winged Tern aspirants won't be intimidated).

If all the elements are as I have described them, then conditions are conducive for finding a White-winged Tern *but* there is still one element missing. The formula for finding a White-winged Tern demands that you time your visit to coincide with that period when juvenile Forster's Terns are capable of sustained flight—Forster's Terns that show dark backs, white rumps, dark caps, and a shallow forked tail just like a basic-plumage . . .

"WHITE-WINGED TERN! In the flock. Going right. Going left. Going right."

"Is it still going left?"

"Right!"

"GOT IT!" "Got it!" "Got IT!" "Got it!"

"That's *definitely* the bird I had this morning."

So, if you follow this formula as stated, if you want to see a White-winged Tern badly enough, success is guaranteed. It's either this or wait until a real White-winged Tern passes close enough to note definitive field marks.

But like I said before, that takes a combination of luck, skill, and patience. And who has time for that? ■

ILLUSTRATION BY JEFF SIPPLE

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Black-necked Stilt by Tim Gallagher

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LIVING BIRD

SUMMER 1995 VOLUME 14 NUMBER 3

GREETINGS FROM SAPSUCKER WOODS

I had to chuckle yesterday when I saw an Osprey fly over the pond, close to my office window. It reminded me of the time three or four years ago when I was interviewing a job applicant here at the Lab. As we sat together—the bank of windows behind him providing an excellent view of the pond—an immature Osprey swooped past, barely 12 feet away. My hand jabbed toward it immediately, almost hitting the man's face, and I shouted "Osprey!" as loudly as I would have if I had been standing on a windswept, rocky outcropping at Hawk Mountain. The man seemed nervous and distracted during the rest of the interview and left thoroughly shaken.

An even worse example of my bizarre birder behavior occurred a few years ago when I was strolling from the Lincoln Memorial to the Capitol in Washington, D.C. That was shortly after I met Rachel, whom I would later marry. Suddenly I saw a Cooper's Hawk fly past in front of us and land in a tree. As crowds of passersby walked around us, I spoke excitedly to Rachel about Cooper's Hawks—the way they will sneak up on unsuspecting birds, snatch one away, and disappear like a ghost. All at once, the hawk dropped off its perch and glided down among some starlings and sparrows feeding on the lawn, creating immediate panic. "He's attacking!" I screamed, causing many of the people around me to duck for cover.

"Sorry," I said, sheepishly. "I saw a hawk. I'm a bird watcher." Everyone continued to stare at me in stunned silence, none of them venturing from their hiding places. "Let's go," I said to Rachel, and we hurried away to the next tourist attraction.

How strange we must all seem to non-birders.

—Tim Gallagher
Editor-in-Chief

Cover: A common resident of thickets, woodland edges, and forests in the Pacific Northwest, the Rufous Hummingbird is a tiny, colorful jewel of a bird. In this stunning image, photographer Edwin G. A. Willcox captures an immature male rufous in a moment of repose before it resumes its tireless task of gathering nectar from flowers.

Right: Dashing powerfully across its windswept domain in the vast grasslands of Alberta, an adult Prairie Falcon returns to its nest cliff. See more of this and other open-country raptor species in the photoessay on page 16. Photograph by Tim Gallagher.

Back Cover: In this impressionistic portrait by photographer John Heidecker, an adult Tree Swallow provides an in-flight meal for one of its young.

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Letters

A "Big Day" for Foraging

I took Jack Connor's challenge ("Fighting Field Guide Overload," Winter 1995) to find a locale where all 18 of the bird foraging methods listed in *The Birder's Handbook* could be observed in one day.

In Ketchikan our birds are hearty but relatively few in number; still, we can produce, in one summer day, views of all 18 methods. Remember, our summer days are 20 hours long.

I chose summer because it's the only season in which we can see a "hover and glean" bird, the fabulous Rufous Hummingbird. Winter would give us a better selection among sea birds and raptors, but no hummingbirds.

Most of the 18 birds require little skill or luck to find. All but one can be viewed from Ketchikan's limited road system (we have only 40 miles of connected road). The Leach's Storm-Petrel is the exception—it occurs at Forrester Island, about 50 miles away. To see all 18 foraging techniques, you'd either need good luck with a Northern Harrier (which is abundant in winter but not summer) or good planning and a quick floatplane excursion to Forrester Island.

I enjoyed your challenge—I hope you enjoyed my entry.

Ernesta Ballard
Ketchikan, Alaska

Please Stay on Trails

I enjoyed "Cutting Through the Fog," by Steve Faccio (Winter 1995), but I was very uncomfortable reading that "you don't truly experience the *krumholtz* until you venture off the trails" on Mount Mansfield, Vermont.

People should NOT venture off the trails. Mount Mansfield hosts rare and delicate alpine tundra plants that are no match for sturdy hiking boots or people "blindly forcing" their way and "belly-crawling" under the trees.

I hope that biologists carefully weighed the threats of off-trail excursions to delicate plants before they left the trails in search of Bicknell's Thrush nests. I'm not convinced their interest in the possibly endangered thrush justified tromping on definitely endangered plants.

Maeve Kim
Jericho Center, Vermont

Saving One Bird

Mel White's essay ("The Unscientific Method," Winter 1995) was touching. As I read the account of the euthanized kingfisher, I was reminded of an experience that hammered into me the same lesson.

In December 1985 a tanker went aground at Port Angeles, Washington, in the Strait of Juan de Fuca. There was a call for volunteers to help clean up oil-soaked birds. On Christmas morning my ex-wife and I arrived at the Port Angeles High School, where we were handed hair-dryers and some birds that had already been washed clean with dish detergent.

For 16 hours we dried grebes, Mallards, scaups, goldeneyes, Oldsquaws, cormorants, and various gulls and shorebirds. Except for the cormorants and gulls, which were feisty, the birds seemed to enjoy having their feathers fluffed and dried.

To me, drying a wild duck in my lap was a profound experience. I can't really explain what it was like to have this kind of momentary relationship with creatures one normally sees only at a distance.

It was additionally satisfying to later find that we had saved between 70 and 80 percent of the birds treated.

Richard H. Norton, Jr.
Bremerton, Washington

We welcome letters from readers.
Address letters to: The Editors,
Living Bird, 159 Sapsucker Woods
Road, Ithaca, New York 14850.

BirdNews

KESTRELVISION

A recent study shows that Eurasian Kestrels can spot the trails made by their favorite prey, voles, even though these trails are invisible to humans (*Nature*, vol. 373, pp. 425-427; 1995).

The kestrels seem to be using their ability to see in ultraviolet light to spot the trails through the grass. Voles use a mixture of urine and feces to mark the trails, and vole urine strongly absorbs ultraviolet light.

In lab tests by Finnish researchers at the universities of Turku and Jyväskylä, kestrels spent far more time scanning scent-marked vole trails under ultraviolet light than under visible light—suggesting that the ultraviolet illumination made the trails visible.

In field tests under natural sunlight (which contains both visible *and* ultraviolet wavelengths), the birds spent more time hunting over artificially scent-marked trails than over clean trails.

Kestrel populations in northern Europe rise and fall depending on the abundance of voles. When vole populations decline, the birds disperse. Scientists have long wondered how they manage to find new, vole-rich territories. The results of this study suggest they just see their way clear.

HELPING WITH HOUSEWORK

Most female Crested Tits build their nests unassisted. But in one Belgian population, about a third of the future fathers lend a hand. That made University of Antwerp biologists Luc Lens, Luc Waters, and André Dhondt (now director of the Lab's Bird Population Studies program), ask this question: Why don't *all* males help with the housework? (*Behavioural Ecology and Sociobiology*, vol. 35, pp. 431-436; 1994).

Comparing helpful and unhelpful males, the researchers found that early in the season, when birds were working on their first broods, only large, well-fed males helped out. A male who's ferrying sticks to the nest has less time to look for food and defend his territory. So unless he's fit to begin with, he can't "afford" the extra energy it takes to help his mate.

Later in the spring, when birds were working on their second broods, males were equally likely to help out no matter what their condition. With food more abundant and territory boundaries already established, lending a hand was less of a burden.

And, like human housework, nest-building went faster with two to do the job. Males were most likely to assist females who had gotten a late start, helping them get back on schedule. The earlier a young Crested Tit fledges, the better chance it has of finding a good winter territory. So, males who lend a hand may boost the chances that their offspring will survive.

KEEP OFF THE GRASS

Suburban populations of Canada Geese have increased in the past 40 years. Many birds have found a home in parks and golf courses, where they eat grass and deposit droppings, to the annoyance of golfers and picnickers.

What to do? Cornell University wildlife specialist Paul D. Curtis recently discovered that a chemical used to flavor grape chewing gum also keeps geese off the grass. Methyl anthranilate, a naturally occurring plant compound, tastes sweet to people, but not to birds—in other Cornell studies, it kept fruit-eating birds away from cherry orchards.

Last summer, Curtis tested the chemical on lawns in suburban King's Park, north of New York City. The results were encouraging; most of the geese that tasted the treated grass headed for a nearby pond to preen and cleanse their palates. Later, many left King's Park altogether.

PAUL CURTIS

Battling over turf.

Methyl anthranilate isn't a perfect defense against nuisance geese—regular treatments would be expensive—but Curtis says the compound may work well in combination with other strategies, such as replacing succulent turf with bad-tasting ground covers, planting trees and hedges near ponds, or using trained dogs to discourage the geese.

Methyl anthranilate, which is produced by the P. M. C. Corporation, recently received EPA approval for nonfood uses. It will be marketed under the name REJEX-IT.

HATCHLING HARPY

Ordinarily, Harpy Eagles live in steamy tropical rainforests, but this past February, one hatched on the cold, high plains of Idaho.

Luckily, the new eaglet was perfectly comfortable—its eyrie was The Peregrine Fund's World Center for Birds of Prey. The young bird, named "Zih" for the Mexican city of Zihuatanejo, was the first captive-bred Harpy Eagle to be born as a result of the center's Harpy Eagle Conservation Program.

Launched in 1989, the program combines captive breeding with field work in Venezuela and Panama to gather information about the huge raptor's biology and behavior. Ultimately, the birds produced through the captive breeding program will be released in areas where the species has been extirpated but suitable habitat remains.

COMPILED BY CYNTHIA BERGER

In the Field

AN EPHEMERAL FEAST

by Jack Connor

Celebrating the connection between birds and bugs

One gray, windy morning last April I was surprised to find hundreds of swallows foraging over Nacote Creek, the tidal river that runs through the center of our town. It seemed too early in the season and too cool a day for the first large flock of spring, but there it was: several hundred Tree Swallows and a half dozen Barn Swallows.

The birds were loosely scattered across the water, but all were flying the same pattern: going with the wind upriver, 20 or 30 feet high, then circling into the wind and descending to skim the surface. Heading downriver, they opened their bills and jabbed, not drinking but pecking at the air, an inch or so above the water. The prey was too small to see through my binoculars—some kind of aquatic insects, I guessed, emerging from their larval state and being swept up by the wind into birds' bills after half a second of adulthood. The swallows were using the wind to help them gather their food the way Sanderlings use the surf and robins use a rainstorm.

I tried counting the jabbing actions of a few of the closest birds as they swept by me: each seemed to peck 10 to 15 times on the downriver portion of the loop before turning to circle upriver with the wind, bill closed, to begin the next sweep. A full loop took less than a minute. If most jabs were successful and each of 400 swallows were capturing 10 insects a minute, the flock would consume 4,000 insects each minute and 120,000 every 30 minutes, I calculated—about a quarter of a million in an hour.

My estimate was only a guess, but there was no doubt the prey had the birds' full attention and the birds were having a feast. Each bird I followed looped upriver and down, over and over again, without slowing; none stopped to spiral with another into one of those bill-to-bill chattering displays that are usually common over the river during spring migration; none rested on the telephone lines over my head. Once, a single bird flew to the line and hovered above it momentarily, as if saying to his companions, "Let's rest a minute, guys." They never looked back. "Eat while you can, you wimp!" their actions said. Seconds later, he was out over the river again, swooping and pecking across the surface.

I quit watching after 30 minutes, but the birds kept going for hours. At the Port Republic General Store that night a birding neighbor asked if I'd noticed the swallow flock that afternoon. "I saw it this morning," I said. "Wasn't that something? Must have been at least 400 swallows."

He harrumphed and shook his head, "I went over the bridge about two P.M., and there had to be at least a thousand of them out over the water—probably two or three thousand," he said. "They looked like smoke clouds."

I fought off the sinking feeling that I had missed more than I'd seen and applied more guesswork arithmetic. A flock of 2,000 swallows feeding at a rate of 10 insects per minute per bird would consume more than a million insects an hour. How many insects could one flock of swallows capture on one river in one day? A million? Two million? Five million?

The next morning, as I hurried past the Nacote, late for work, three swallows high in the sky over the bridge were the only ones in sight. The creek looked flat and barren. Could the swallows have emptied their cupboard in a single frenzied feeding? Apparently, the flock had grown during the day as passing birds spotted the feeding birds below and descended to join them. Had the insects mistimed their emergence so that, by their bad luck, it had coincided with a passing migration of swallows? Was that unlucky species now eliminated from our section of the river? Could it possibly recover its numbers in time to feed next spring's migrants?

That evening, a neighbor whose house is one block from the water called us. "I'm afraid to open the door," she said. "There's some kind of bug invasion going on. They look like mosquitoes, only tiny, and there are millions of them. They're covering the street lights, the porch lights, the garage lights, our screens and windows. It's like an eclipse over here."

Twenty-four hours later they reached our house, three blocks from the river. My daughters discovered them on our living room window and pointed them out to Jesse. "Wow, Mom! Look at all those bugs."

"Don't open the—," Jesse said, too late. The insects pushed into the living room's air space like ink bubbling into clear water. They darkened the walls, the lamp shades, the blinds, the kitchen counter. Swatting, muttering, swearing, we turned off the lights in the living room and kitchen and retreated to the back bedrooms, hours earlier than usual.

By morning they were dead. I swept 30 or 40 bodies off the windowsill with one brush of my hand. They were as light as dust. I saved five in a plastic bottle for identification, then we sucked up the rest with a vacuum cleaner.

They were midges, our identification guide said, members of the order Diptera (two-winged insects) and the sub-order Nematocera, which also includes the crane flies and mosquitoes. They looked like undersized mosquitoes without the biting proboscis: long legs and long feet; finely veined wings shaped like paddle blades; nearly transparent abdomens; big, dark eyes. They lay their eggs in the water in gelatinous clusters, the book said; the red larvae, called "bloodworms" by fishermen, are a favorite food of fish and so they spend most of their lives buried in the mud. After weeks or months underwater, they rise to the surface and emerge as adults to fly for a day or two searching for a mate.

Oddly, all five specimens in the bottle had the feathery antennae that identified them as males. Back in the living room I found three more bodies on the blinds. Each of these was also a male. Thumbing through another book, I learned midge swarms are "largely or entirely male." The females lurk out of sight, hiding in the grasses, until one at a time, they are lured into the swarm of males. I had already abandoned hope of surveying the midge swarms all over town to calculate their numbers. (How many had landed on our house alone? How many other houses had swarms as large as ours or larger? How many swarms had clustered on barns, garages, and other buildings?) Now I had to contemplate the possibility that even if I could conduct a census of those millions swarming it would represent only half the population that had emerged from the river.

I walked back to the Nacote trying to find a perspective on the sequence of events and thinking how birders might take a lesson from gardeners. Gardeners love soil, not just because plants require it but also for its own sake. Watch a gardener digging in the garden, turning the earth, shoveling manure, and you'll see someone celebrating the connectedness of nature: soil, seed, and flower are a unity to gardeners. "Look at this great dirt!" they exclaim with joy in their voices. "This horse manure is gold!" they'll say.

Bird watchers, yours truly certainly included, more often seem oblivious to the insects and seeds that are as responsible for the birds we love as soil is for the gardener's plants. Of course, we all know intellectually that no bird can survive without the support of its ecosystem. We don't often celebrate that connection, however. We don't exclaim, "Look at these great bugs!" or "These cedar berries are gold!"

"Heading downriver, the swallows opened their beaks and jabbed, not drinking but pecking at the air an inch above the water."

MARK WILSON/WILDSHOT

Four days had passed since the feast and not a swallow was in sight on the river. Under the bridge where swallows nest each summer, only the resident pigeons stirred. I scanned the water. The midges' eggs were floating there, I knew now. The lucky ones would sink uneaten, flourish in the muck at the bottom, escape the fish and turtles as they returned to the surface, and finally rise into the sky in an attempt to find a mate before the birds found them.

I wished them safe passage. ■

Flying Field

SECOND SIGHTINGS

by Mel White

Sometimes one look at a life bird is not enough

It was a cold, rainy Valentine's Day in Kansas City, Missouri, and I was driving slowly around in the high-class suburbs west of Wornall Road, trying to figure out the difference between a street and a "terrace." I wouldn't have blamed a cop for pulling me over. I was even feeling a little suspicious of myself, not to mention stupid. In an otherwise orderly arrangement of addresses, it seemed that the street I was looking for had vanished from the grid. I had to admit that this was unlikely; ergo, the fault must lie with my navigational ability—a level of incompetence that did not bode well for the trip I would soon be taking to Amazonia.

I finally stumbled upon what I thought was the house mentioned on the local bird hotline. I pulled over to park on the roadside, and then I really felt suspicious. Every time somebody drove by, I raised my street map and pretended to study it intently. That, plus my out-of-state license plate, I thought, might give me an excuse to be here. But what could I say if a passerby stopped?

"My Varied Thrush wasn't supposed to be there, in the two-car-garage suburban Midwest. It was supposed to be on a trail in Olympic National Park."

GREGORY K. SCOTT

Kind Stranger: "You need some help?"

Me: "Oh, hi. Right. Could you tell me where the . . . uh, Nelson Museum of Art is?"

K.S.: "Yeah . . . sure. It's about eight miles north of here. Great big building. You can't miss it." (He leaves quickly to call the police.)

I rolled the window down a little, trying to strike a balance between being able to see and getting soaked by drizzle, all the time thinking: silly, silly, silly. About then a long trilled note rang out from a tree across the street. I looked up and, just like that, I saw it: my first Varied Thrush.

I ought then to have been happy;
I was not. — *Marcel Proust*

In college I actually took a class called Aesthetics, but the only things I remember about it are the cover of the textbook and the girl who sat next to me. I approach this subject—call it Quality of Sightings—advisedly, knowing how easily it leads to the unbearable Holier-Than-Thouness that plagues birding. I'm holier than nobody, and in fact I confess that bird watching sometimes leaves me with deep feelings of regret—nearly always the result of either (a) chasing a rare bird and not finding it, or (b) chasing a rare bird and finding it.

My Varied Thrush wasn't supposed to be *there,* in the two-car-garage suburban Midwest. It was supposed to be on a trail in Olympic National Park, a place I wanted to visit as much as I'd wanted to see the bird. The lush rainforest, the fog-shrouded mountains, the spruce and hemlock and moss-covered maples—that was the fantasy, and the thrush was just a part. Then, visiting a friend in Kansas City, I called the local hotline, and there it was: the choice between wanting to see a bird and wanting to see it where it ought to be.

Life would be easier if, deep down

inside, I honestly *were* pure: if I could point my nose in the air and say, "I don't chase vagrants; I'd rather see a bird in its natural habitat," and mean it. Or if I were one of those people who'd be perfectly content to look at a bird trapped in a show window at Tiffany's as long as they could tick it off their lists. But no—I compromise in a way that fails to satisfy on all fronts. Call me the Bill Clinton of birding.

Take, for example, the Buff-bellied Hummingbird that spent weeks at a feeder 30 minutes from my house in Arkansas. I didn't feel any great compulsion to go and look at it; I'd seen the species Where It Ought To Be, in the Rio Grande Valley of Texas. But . . . confession time: it was laziness and procrastination more than scruples that kept me from driving there. Now, in retrospect, the essential fact is that I don't have the buff-belly on my state list, and another Ice Age may come and go before it shows up again.

Some years ago, I heard a third- or fourth-hand rumor that a Highway Department employee, driving through the boonies inspecting bridges, had seen three swans near a town called (believe it or not) Seaton Dump. I'd never seen a wild swan, so the next morning I called work to say that I'd be late and then took off, full of anticipation at the thought of seeing such a majestic creature at last. After meandering for an hour along muddy dirt roads in a driving rain, I happened to glance over and see (orchestral fanfare) three white barnyard geese swimming happily through a flooded woodlot.

On the way back home, a truck threw up a piece of gravel and chipped my windshield.

Why exactly am I doing this? I often wonder. After all these years, I've figured out that the question comes up not because I've won or lost, but because of how (or where) I've played the game. If I'm not going to see a swan, I'd rather not see it at Yellowstone than at Seaton Dump.

Last year, passing through the Texas Hill Country, I decided to make a quick detour to check off the famous Blue-footed Booby that had settled in along the shore of Lake Lyndon B. Johnson. Talk about feeling silly. . . . A sign reading "This way to the booby" pointed toward the rear of a lakeside home, where I found a small busload's worth of people from Florida, New York, and I-don't-know-where-else waiting on the deck, flipping through two guest books filled with hundreds of names.

If I'm not going to see a swan, I'd rather not see it at Yellowstone than at Seaton Dump

Pretty soon the booby, tired of playing with the cormorants on the lake, came in for a flaps-down landing on the boat-dock diving board, its regular roosting place. (*Why exactly am I doing this?*) The bird was so pathetically lost and lonely that when a familiar human neighbor walked up, it immediately began bowing and screeching in what I assume was some sort of courtship ritual. Or maybe I'm anthropomorphizing in the wrong direction: maybe this bird was the Madonna of the booby world—there's a joke there somewhere—and it was deliriously happy at being the center of so much attention. Either way, this backyard tableau was not a scene normally encountered in nature. At such times, bird-listing seems to me little different from collecting paperweights or visiting a series of single-species zoos.

Luckily for my judgment-impaired sensibilities, vagrants by their very definition don't often present themselves to be chased; mostly, birding means getting together with friends and going to interesting places to see what happens. And sometimes, when the sun shines just so, and we look around at the right moment, that glint on the rocks turns out to be gold.

A month after my Texas trip, thanks to a serendipitous set of circumstances involving choppy seas and engine failure, I found myself spending the night on a boat at Half Moon Cay, a high spot on the coral reef off the coast of Belize. Half Moon is exactly the sort of palmy tropical island paradise that comes to mind when you hear the words "palmy tropical island paradise." One reason I was happy to be there was the colony of Red-footed Boobies crowded in the dense geiger-tree forest at its south end. In late afternoon I walked down the beach to watch the boobies quarrel with the Magnificent Frigatebirds that share the nesting grounds—the boobies sitting there like the *bobos* (dunces) that early Spanish sailors thought they were, the male frigatebirds spreading their wings and swinging their distended strawberry-red throat pouches back and forth, making themselves irresistible to females. In the Technicolor sunset it was a stunning scene, a raucous, dirty, fly-infested, excrement-spattered, stinking, probably noxious scene . . . and I would never have had the thrill of seeing it if I hadn't been a birder.

If a life list is a collection of memories—and that's all mine is—then Red-footed Booby has a big gold star beside it, while Blue-footed Booby is stuck with an asterisk. Like Roger Maris's 61 home runs, it's in the record books, but there's something not quite real about it.

For now, anyway. . . .

I haven't settled on a name for it—Second Sighting? Real Lifer?—but the right experience can erase that vexing asterisk, can free a zoo bird from its imaginary cage, so that I will remember not the pair of Blue Buntings at a Texas campground feeder, but the little flock at Chichén Itzá; not the introduced Eurasian Skylarks that flushed reluctantly on a blustery day in the Pacific Northwest, but a blue sky full of them, singing their endless twittering flight songs on the Dorset coast of England.

And, as it happens, not the Kansas City Varied Thrush, but the ones I glimpsed flitting through the trees the next year in Washington State. I remember it was cold that day, too, and the clouds came all the way down to my boots and the rain was dripping off my hat brim—but I don't remember feeling silly even for a moment. ■

A raptor's-eye view of the wind turbines in California's Altamont Pass. Can they keep churning out clean energy but avoid killing birds? A task force of experts, including Cornell Lab of Ornithology director Charles Walcott, is trying to prevent close encounters of the deadly kind.

KEVIN SCHAFER/MARTHA HILL

Tilting at Windmills

BY CHARLES WALCOTT

Are raptors and wind turbines on a collision course?

In the Altamont Pass southeast of San Francisco, California, 7,000 wind turbines stretch endlessly over 80 square miles of bare hills. It's an impressive sight. On a windy day this "windplant™" can generate as much as one percent of California's electricity.

One reason the windplant exists is that modern wind-turbine technology can generate electricity for five cents per kilowatt-hour, a cost comparable to that of coal-fired generators. Unlike coal-burning power plants, however, wind turbines produce no toxic exhaust or waste. Given the success of the Altamont windplant and recent increases in turbine efficiency, both electric utilities and wind turbine manufacturers are interested in building wind-energy plants in other areas.

Unfortunately, wind turbines aren't completely without environmental costs; they kill birds. Not tiny passerines like sparrows, but large, impressive, and sometimes rare raptors. A 1992 California Energy Commission study estimated that 567 raptors, including 200 Red-tailed Hawks and 78 Golden Eagles, were killed in collisions with the Altamont wind turbines over a two-year period.

BHL

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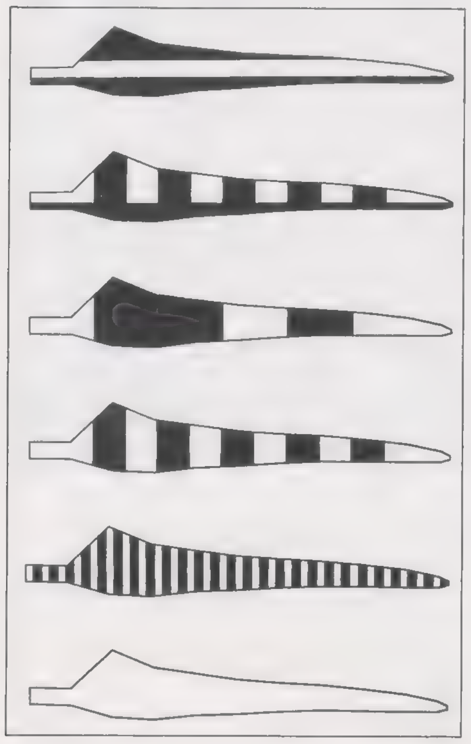
This bird mortality is a serious problem for the wind power industry. Eagles are protected by the federal Eagle Protection Act, the Migratory Bird Treaty Act, and the Endangered Species Act. The U. S. Fish and Wildlife Service (USFWS) could shut down the turbines at any time for killing eagles. The raptor kills have made the National Audubon Society and other conservation organizations concerned about proposals from power companies to establish windplants in other parts of the country, despite the reductions in pollution wind power could achieve.

Do birds fail to notice the whirling blades? After testing the eyesight of American Kestrels, above, the task force recommended using striped blades like the ones below, second and third from the bottom. When they spin, the stripes turn into bold circles.



The bird kills in the Altamont led KENETECH Windpower, the world's largest manufacturer and operator of wind energy systems, to convene a task force of bird experts to try to resolve the problem. The first meeting took place in August of 1992. Headed by Tom Cade, Professor Emeritus of Ornithology at Cornell and founder of The Peregrine Fund, the task force also includes Mark Fuller, a raptor expert from the National Biological Service, Vance Tucker, an expert on raptor flight from Duke University, Mel Kreithen, an expert on avian sensory physiology from the University of Pittsburgh, and me.

Before we could make any recommendations about how to keep raptors out of turbines, we needed to know how the collisions occur. Raptor kills are a rare event, however. Only two collisions between raptors and turbines have been witnessed in the Altamont. The task force actually saw one. We were touring the windplant on a lovely sunny day, warm but windless. An American Kestrel sitting on a meteorological tower some distance away suddenly took off and flew straight into the side of a stationary turbine. We watched in astonishment as it fluttered to the ground. It must have recovered, however, because when we drove to the turbine, we could not find the bird.

We were lucky to see this strike—the collision rate is between 1.7 and 5.8 raptor strikes per 100 turbines per year. In theory, this means that you would have to watch a single turbine for about 33 years to see a strike. Since KENETECH Windpower wanted results in a somewhat faster time frame, we had to find a way to increase the frequency of bird-turbine interactions. Our solution was to use homing pigeons.

Both Mel Kreithen and I have studied homing pigeons for years. I've used pigeons to study animal navigation; Mel, to understand their sensory capabilities. Although pigeons are not raptors, we can do things with them that wouldn't be feasible with large raptors. For example, homing pigeons live in lofts, and when they are released somewhere else, they return to their lofts. By arranging suitable loft and release sites, we could fly pigeons through the strings of turbines at the windplant.

Using pigeons as raptor stand-ins, we hoped to learn whether the raptors got into trouble because they couldn't see the moving turbine blades, or because they saw them but didn't associate them with danger. We expected that a number of our pigeons would have unpleasant encounters but, to our surprise, they flew splendidly between and among the turbines. In more than 7,000 flights over a period of about a year, only three pigeons have been hit and only one was killed.

How were the pigeons avoiding the turbines? Mel Kreithen developed an elegant device to track the birds in flight. He mounted a pair of video cameras and a laser range finder on two tripods, the heads of which were equipped with angular sensors. While the cameras record exactly what each flying bird is doing, information about the angle and elevation of the tripod heads gets fed into a portable computer. By setting the system up with the cameras some distance apart, Mel can track a flying pigeon and determine its exact position in space and in relation to the turbines.

So far Mel has tracked more than 850 pigeon flights around and among the turbines. The pigeons are remarkably skillful at avoiding turbines. They fly around, over, or below the blades: very few take the risky path through the blades themselves, and they do this only

HUGH McISAAC (2)

with the slower-moving blades of the largest turbines.

Mel's results show that, in daylight, pigeons can see the blades just fine. This baseline data is important for another reason; if we change the turbine blade by making it more visible, we want to be able to measure the effect of the change on the pigeon's flight. Perhaps if the blades were modified the pigeons would veer away from the turbines at a greater distance.

Since pigeons were so successful at avoiding the turbines in broad daylight, we wondered whether low light conditions in the late evening or early morning were getting the raptors into trouble. Mel knew from previous studies that pigeons have poor vision in dim light, even in circumstances where humans can still see well. He started flying pigeons later and later in the evening. To his astonishment, they avoided the turbine blades even when it was so dark that the pigeons had to be equipped with tiny lights so the trackers could follow them.

Considering all we know about pigeon vision, it's surprising how much less we know about the visual capabilities of raptors—especially since every birder has heard stories about raptors' remarkable vision. We found only a few studies of raptor vision in the scientific literature, each with somewhat different results. Yet if we were going to try to modify turbine blades to make them more visible to raptors, we needed to know what raptors can see. Do they see the turbine blades as well as pigeons do? The published papers don't really tell us.

The task force hired Hugh McIsaac of Boise State University, a former student of Mel Kreithen, to begin a major study of raptor vision. He trained American Kestrels to discriminate between a gray square and a white square with black lines—they hop to one perch when they see the gray square and to the other when they see lines. The pattern of lines looks gray when viewed from a distance, so by presenting the kestrels with lines of various thicknesses, he can tell how good kestrels are at discriminating details.

The kestrels are hard at work, and preliminary results are just beginning to come in. So far it appears that kestrels can tell the difference between fine lines and gray squares just about as well as pigeons and humans can. McIsaac plans to expand his work to include both Red-tailed Hawks and Golden Eagles.

The results from these studies will tell us how large any warning patterns we put on the blades must be to be visible to raptors. We also hope to learn what colors might be most conspicuous to raptors. Meanwhile, given that McIsaac had shown that raptors and humans have similar visual acuity, task force member Vance Tucker decided that he would try to see what made blades more conspicuous to him. He drew pictures of turbine blades with various designs and spun them on a phonograph turntable at 33 ⅓ and 78 RPM.

The results were dramatic. Designs with stripes parallel to the long axis of the blade looked like gray blurs as they spun. Stripes across the blades stood out as circles. These observations led us to build a model turbine that could be equipped with blades of different patterns. In an effort to get fast answers, McIsaac tested the visibility of various patterns on college students rather than raptors. (Psychology students are much easier to train than hawks.) The next guinea pigs were the task force members; we watched the blades turn under a variety of different lighting conditions. We confirmed that blades with black-and-white stripes across the width were significantly more visible than blades painted the current uniform off-white color.

Based on the raptor studies and on our observations of painted model turbine blades, the task force has recommended painting a pattern of radial stripes on the turbine blades to enhance their visibility. KENETECH Windpower plans to try this on some of their

When task force members wanted to see how birds in flight avoid wind turbines, they used homing pigeons, below, as raptor stand-ins. Above, physiologist Mel Kreithen videotapes a flying pigeon; special sensors on the camera tripod determine the bird's position relative to the blades.

MELVIN L. KREITHEN (2)

turbines; then, we will examine the effect on flying pigeons and, eventually, on some trained raptors. We hope that if the blades are more conspicuous, raptors will begin their avoidance maneuvers when they're still far enough away to avoid an accidental encounter.

Cynthia Struzik, the USFWS agent in the Altamont area, suggests that windplant collisions may happen, not when birds fly through the whirling blades, but when birds that have perched on the towers fly down to attack prey. Altamont Pass is grazing land, and the short grass supports a bumper crop of ground squirrels and voles. Since there are no trees, raptors use the turbine towers and power poles as vantage points when they hunt. When a squirrel appears, they dive down and grab it. Perhaps they're not as vigilant as they should be about the position of the turbine's blades when they're attacking prey.

The task force reasoned that perhaps we could reduce mortality if we could discourage the birds from perching on the turbines. The birds tend to sit on the cross braces of the lattice towers, so we've tried various "perch guards" to make their seats uncomfortable, including metal and plastic spikes and a thin strip of metal. We tested the guards with trained raptors. The most promising solution so far has been a thin wire strung a couple of inches above the top of the strut. It didn't injure the birds, and they clearly didn't like it. To keep birds off the catwalk at the top of the turbine, we also tried enclosing the upper part of the tower in a wire fence. Together these modifications reduced perching by about 50 percent, but some birds still clung to the outside of the wire fence, and others perched on the top of the turbine.

The electric power industry prevents birds from sitting on power poles not just by making the dangerous places unpleasant, but by providing comfortable alternative perches. So perhaps we could reduce the rate of wind-turbine perching even further if we offered the Altamont birds some alternative, safe perches—the raptor equivalent of armchairs with drink holders. But this solution leads to new questions: to what extent should the windplant be made even more attractive to raptors? If more birds are attracted to the area, more birds are at risk.

This issue of birds at risk led the task force to sponsor a study of Golden Eagle distribution in the Altamont. We chose the Golden Eagle for two reasons: first, it's one species suffering significant mortality in the windplant. Second, it is the largest, most obvious, and

KEVIN SCHAFER/MARTHA HILL

rarest of the raptors being affected by wind turbines. We need to know how significant windfarm mortality is on a population level.

Early last spring when the task force visited the Altamont, Hans Peeters, a professor who has been studying Golden Eagles in the Altamont area for many years, took a group of us to his nearby study area around one of the reservoirs supplying water to San Francisco. The land around the reservoir is grazed and the short grass supports a sensational population of ground squirrels, making it prime Golden Eagle habitat. As we drove around the reservoir one afternoon we saw five Golden Eagle nests, an extraordinary density for this species. Peeters says these breeding adult birds maintain feeding territories and aren't likely to wander into the windplant. If so, where do the eagles in the windplant come from? Are they migrating through the area?

To answer this question, Grainger Hunt and his colleagues from the Santa Cruz Predatory Bird Research Group radio-tagged 31 adult Golden Eagles at sites around the Altamont last winter, including a few birds within the windfarm. (They also located 54 Golden Eagle nests within 30 kilometers of the Altamont Pass wind production area.) Tracking these radio-tagged eagles by airplane, they found that all but one remained within the study area. This implies that the eagles in the Altamont are not migrating through—they seem to be year-round residents. Furthermore, as Peeters had maintained, the resident birds seem to remain on their breeding territories, well away from the windplant. The nonterritorial, nonbreeding adults and juveniles are the ones that appear to wander; these birds are at greatest risk from the windplant.

Of the 31 radio-tagged birds, four have died. One female eagle was killed by another, one died of lead poisoning, and two adults—a male and a female—were killed by turbines. Of the 47 young raised in nests near the Altamont, 25 juveniles have been radio-tagged. Hunt will follow the dispersal of these young to see where they go and how many of them find territories and breed.

This study of eagle populations, along with the controversy over putting perches in the Altamont, brings up an important issue. What is the role of the Altamont in providing raptor habitat? One point of view, which USFWS agent Cynthia Struzik supports, is that we should try to reduce the number of raptors in the area. If raptors were completely excluded, none would be exposed to danger, and turbine mortality would drop to zero.

This is an attractive idea; it would resolve the conflict between turbines and birds and comply with the provisions of the various federal acts. Yet without their banquet of Altamont ground squirrels, how many raptors would survive the winter? Despite mortality from the wind turbines, the Altamont probably provides a substantial food resource for wintering raptors. Personally, I would guess that the risk of being hit by a turbine blade is far less than the value of the food the Altamont provides. Besides, there's no reasonable way to keep the raptors out.

Above, a Golden Eagle, one of the federally protected raptor species found in the Altamont area. Raptors hunt for rodents and other prey in the short grass at the site, left; wind turbines make convenient vantage points. The task force is testing "perch guards" to keep birds from selecting a dangerous seat.

Another logical solution would be to remove the wind turbines and preserve the Altamont as grazing land and a sanctuary for wintering raptors. This idea may be logical, but it's not practical; it wouldn't be economical to preserve the area for grazing without the income and environmental benefits that wind energy provides. Without the turbines, the Altamont would slowly become a suburban tract covered with houses and shopping malls—a land use that would be far less favorable for raptors than the windplant.

The solution, as is so often the case in conservation, appears to be compromise. We must learn how best to keep raptors from flying into the turbines. In designing new windplants we must learn what bird activity to look for in an area and try to place turbines where they will not interfere with the birds' normal movements. The substantial basic research currently underway, largely funded by KENETECH Windpower, will help us to meet both of these goals.

We also need to learn more about the ecology of raptors so that we can better understand how the food supply of the Altamont affects their survival. And we need to know the effects of turbine mortality on raptor populations. We all want raptors to thrive, but we also want the nonpolluting energy that wind power can provide. The task before us is to make these two goals compatible. ■

Charles Walcott is Louis Agassiz Fuertes Director of the Cornell Laboratory of Ornithology.

JAMES WEAVER

Prairie Predators

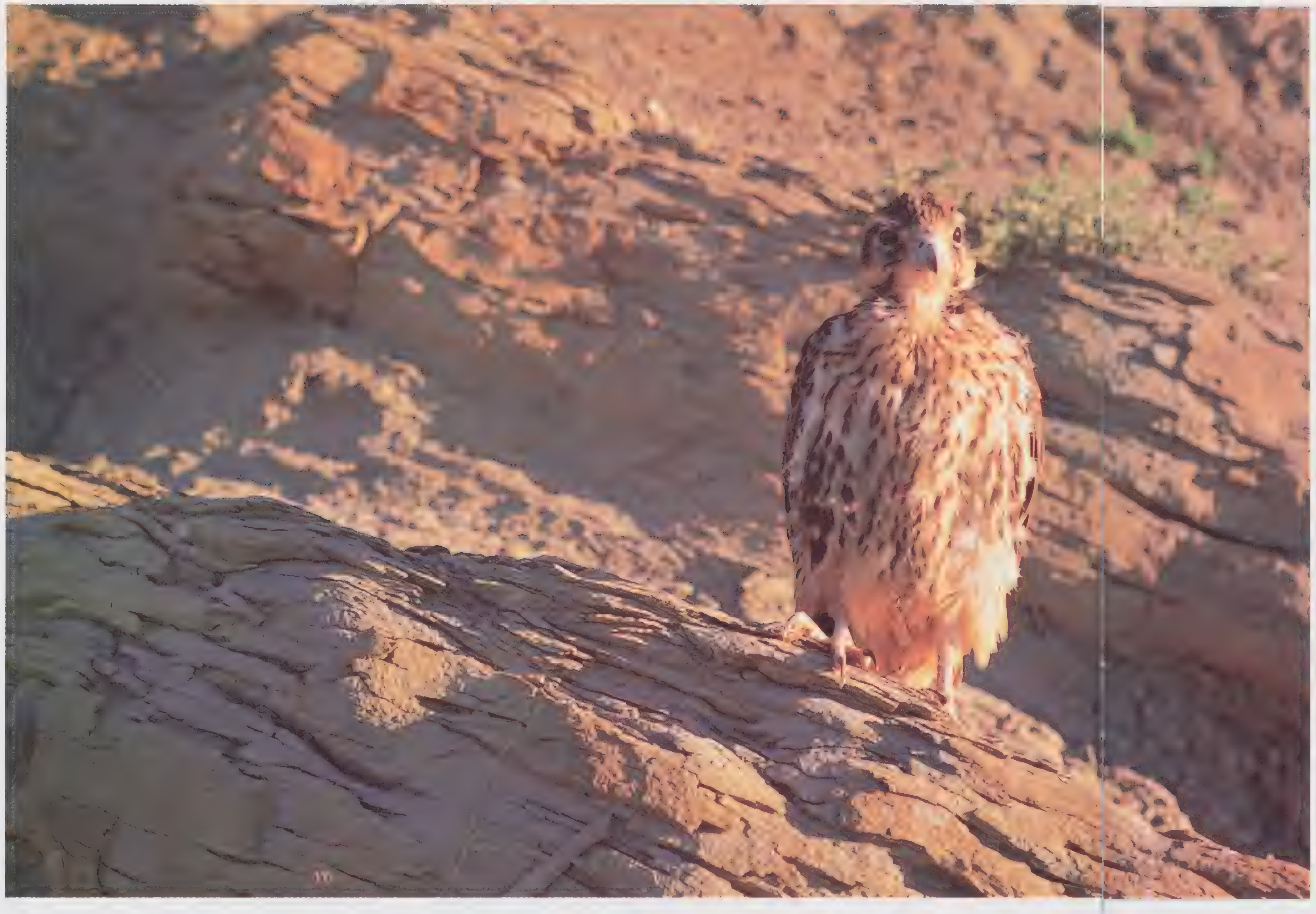
TEXT AND PHOTOGRAPHS BY TIM GALLAGHER

A gallery of grassland hawks and falcons

On the prairies of North America, the broad forested expanses of the continent give way to limitless vistas of open sky and rangeland. It is a beautiful though brutally harsh land, where plants, animals, and landscapes are continually buffeted by quickly changing weather conditions—gale-force winds, hail, driving sleet, and snow, alternating with periods of scorching heat. Tiny, delicate wildflowers hug closely the contours of the land to avoid the wind's onslaught. Badgers, coyotes, deer, and antelope eke out perilous existences with little shelter to hide or protect them. In a few preserves, bison still graze calmly—remnants of an earlier time when great herds of the animals flourished there.

But for me, the prairie is above all a place to see raptors. Here large buteos—Ferruginous, Swainson's, and Red-tailed Hawks—perch or hunt close to the roads, easily visible in such an open area. The birds often nest in tiny trees, less than 12 feet above the ground. Merlins dash past at dazzling speeds, frantically pursuing Horned Larks and other small grassland birds. Prairie Falcons make low-level patrols, searching for careless birds or ground squirrels feeding too far from their burrows.

The pages that follow present a portfolio of the raptors I've photographed and come to know on the great prairie grasslands of North America.

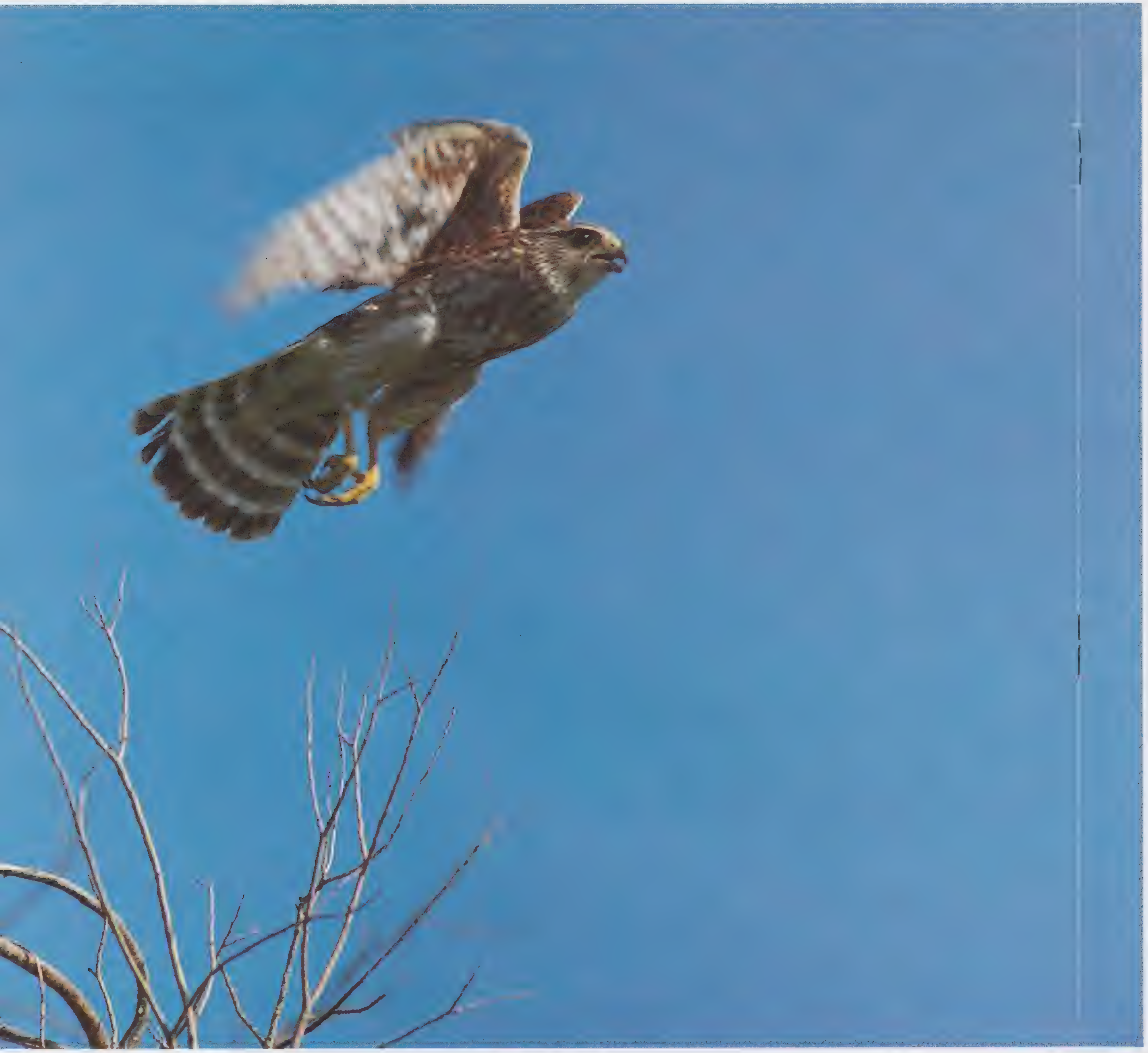


Though in other parts of their range Prairie Falcons often nest on barely accessible ledges on rock outcroppings or buttes, many of those found in Alberta nest on dirt cutbanks, sometimes scarcely 50 feet high. It's a matter of necessity. These cutbanks, carved by rivers through the rolling green hills, provide the only nest sites available to these cliff-nesting raptors.

One of my favorite prairie raptor species is the Ferruginous Hawk—largest and mightiest of the buteo clan. Strikingly marked, with a brilliant white breast, accented with rusty thighs and back, this bird is an unforgettable sight. Ferruginous Hawks seem to build their nests in any available tree, no matter how low, and sometimes even nest on the ground.

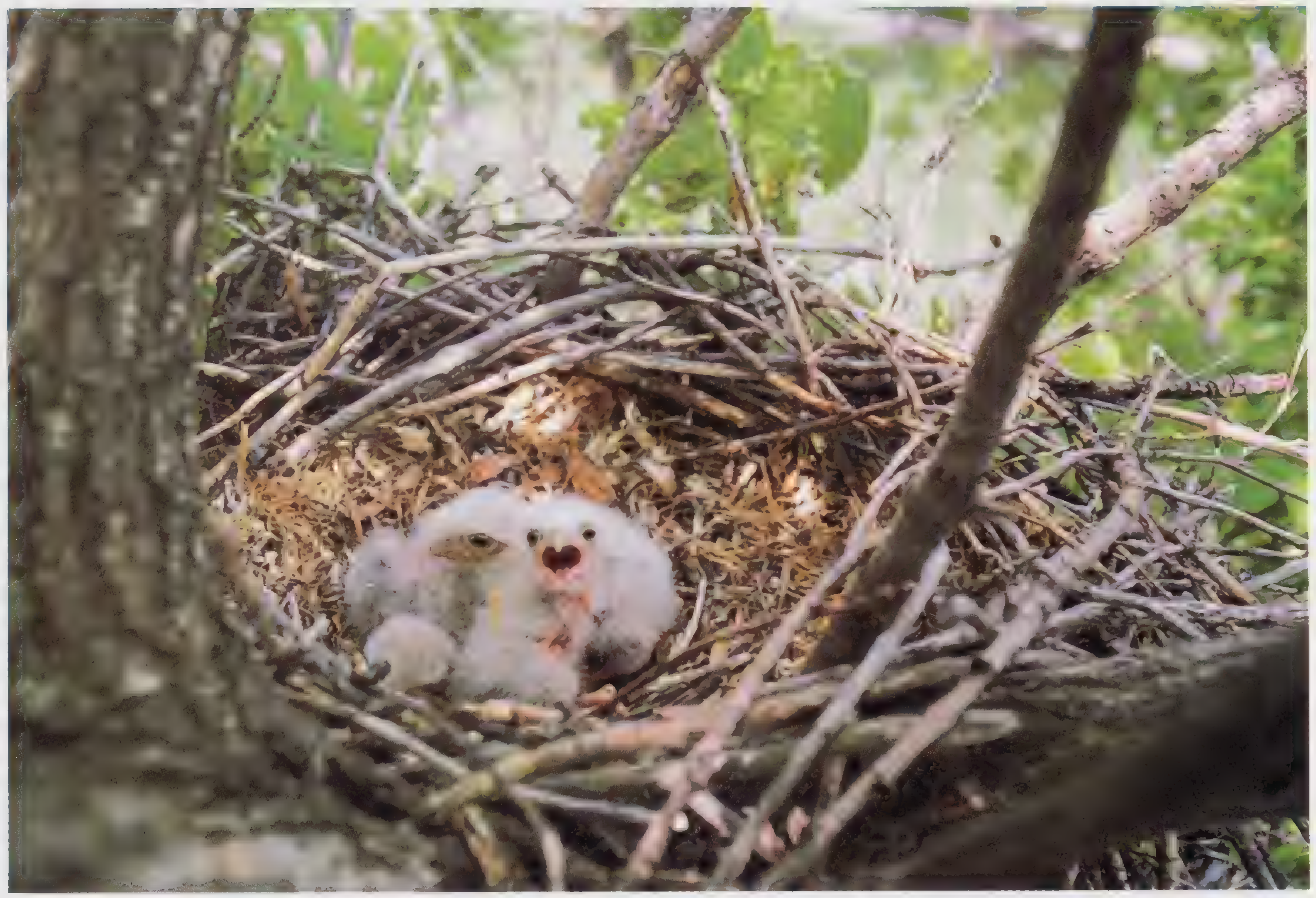
On the Alberta prairie, where I've watched them, Ferruginous Hawks live almost entirely on ground squirrels. Joe Schmutz, a prominent Canadian raptor researcher, estimates that one pair of these hawks and their young consume approximately 500 ground squirrels in the course of a typical breeding season.

Ferruginous Hawk nests are easy to identify, even if no adults are present. The large size of the sticks (perhaps more aptly called branches) that the birds throw into their haphazard nest structure is a dead giveaway. So, too, are the chunks of sod and cow pies with which they line their nests.



The most dashing raptor on the prairie is surely the Merlin. The grasslands have their own distinct subspecies, the "Richardson's" Merlin, much different in coloration from the other North American races. People usually think of Merlins as being dark, distinctly marked falcons. But the prairie is a land of indistinct horizons and pastel colors—powder blue skies; fields of pale green or buff. Here the bleached colors of the Richardson's Merlin create an ideal camouflage.

The power dive or "stoop" of a hunting Merlin, at right, is awesome to behold, as the bird folds up and plummets like a meteor toward its prey. Instead of building their own nests, Merlins generally reuse old stick nests, such as the crow's nest below.



A Landlubber's Guide to Pelagic Birding

Birding and science meet on the high seas

BY KRISTI G. STREIFFERT

The *Country Girl* puttered out of her slip at 5:30 A.M. As soon as we reached the open water of the Atlantic, Captain Alan Foreman revved the engines and we skimmed ahead. My first pelagic birding trip had begun. Or so I thought. Several hours passed before we finally reached the vivid blue waters of the Gulf Stream. By then I was starched by salt-spray, rosy with sunburn, woozy from the waves, and—I admit it—kind of bored.

Brian Patteson, pelagic trip organizer and leader, saw my eyelids drooping. "We usually see more birds than this," he said. "By this time last Saturday we'd seen Cory's Shearwaters, a Greater Shearwater, Wilson's Storm-Petrels . . ."

Just as my eyes began to close again, a shout from the ship's helm roused the 30 people on board into motion.

MIKE DANZENBAKER

With flaps down and airbrakes fully engaged, a Sooty Shearwater prepares to splash down near a boatful of eager pelagic birders off the coast of California.

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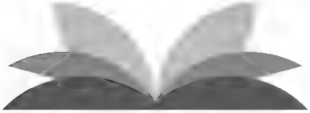

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A Pink-footed Shearwater, above, slices past a pelagic birding boat twenty miles out from the Central California coast. At right, the Brown Booby that thrilled birders on the author's first pelagic excursion.

MIKE DANZENBAKER

"Brown Booby!"

We rushed to the port side of the 35-foot-long vessel.

"Is it a Red-footed Booby?"

"Where? WHERE?"

Binocular straps tangled with sunglass retainers, threatening to strangle excited birders. A hat whisked overboard.

"Brown Booby! Brown Booby!"

"A first confirmed record for North Carolina," Brian shouted.

The bird in question flew around the stern to starboard, then off the bow and out of sight.

Patteson, trying to steady a long-lensed camera that had materialized from some handy but hidden spot, yelled to the captain, "Hit it!"

And we were off, speeding after the bird at 25 knots, which is a "hang-on" 36 miles per hour. But could we possibly overtake the bird? Suddenly the booby was at the stern again. The captain cut the engine and immediately the world became still and quiet. Someone threw out a dead fish. As the booby swooped down to feed, every field mark—brown back and chest, white underparts, yellow feet, yellow bill—showed crisply through our binoculars.

We exchanged back slaps and grins all around.

One man who'd been desperately seasick all day turned a normal color for a few brief moments.

"By golly, a record," he said.

Later, back on shore, Brian Patteson, one of the pioneers of East Coast pelagic birding, explained, "The potential for more discoveries, more records, and more data is enormous."

Although the bulk of our knowledge about many North American birds is built on at least a century of science, the lives of many of our seabirds outside their breeding colonies have remained mysterious.

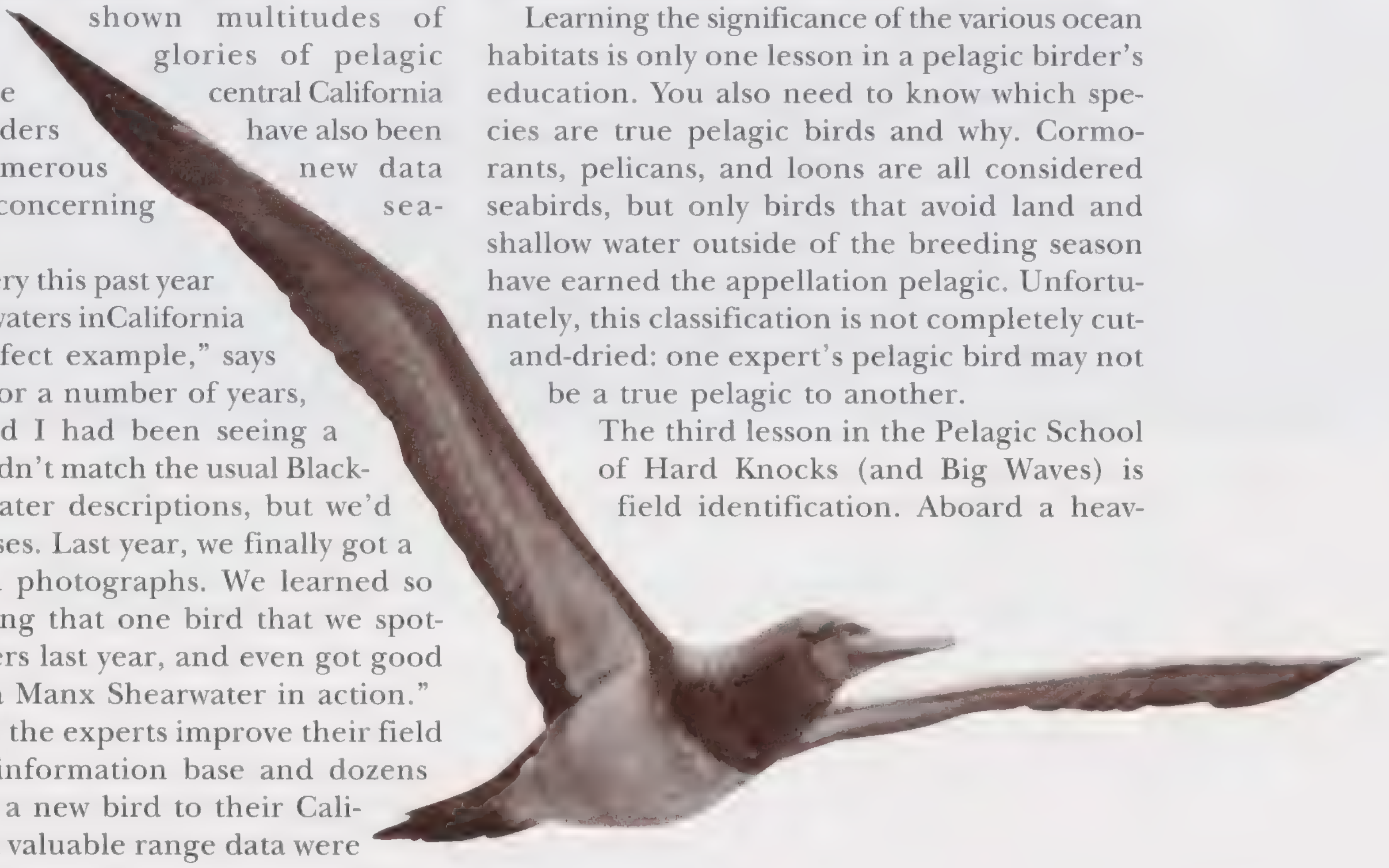
"Only in the past fifteen to twenty years have we begun to examine questions about what determines the patterns of distribution and ecology at sea," says Todd Hass, who is completing a doctoral study on seabirds. "The availability of pelagic bird-watching trips has played a major role in my ability to complete my research."

Serious scrutiny of pelagic birds by birders has escalated exponentially in recent years, and the increasing number of eyes on the horizon are contributing volumes to the knowledge of seabird ranges. In a fortuitous spiraling cycle, these results engender more and more scheduled pelagic trips, and the availability of the trips draws ever more seabirders.

The result is that birders, taking a trip for their own fun, satisfaction, and education, in effect sponsor the experts aboard. "I'll be taking my one-thousandth boat trip this year," says Debra Shearwater of Monterey Bay, California. Her 18-year-old company, Shearwater Journeys, has shown multitudes of people the glories of pelagic birding off the central California coast. The birders have also been present as numerous new data were gathered concerning seabirds.

"The discovery this past year of Manx Shearwaters inCalifornia waters is a perfect example," says Shearwater. "For a number of years, my skipper and I had been seeing a bird that just didn't match the usual Black-vented Shearwater descriptions, but we'd get only glimpses. Last year, we finally got a good look and photographs. We learned so much identifying that one bird that we spotted twelve others last year, and even got good videotapes of a Manx Shearwater in action."

Not only did the experts improve their field identification information base and dozens of birders add a new bird to their California lists, but valuable range data were collected. "The funny thing was, we even have proof that we've seen these birds before, because a photographer friend of mine used these new I.D. skills on his old photographs and realized that he had at least one photo of a Manx Shearwater," she says.


BRIAN PATTESON

On the morning I spoke with Debra Shearwater, my phone call woke her from the first sleep she'd had in 20 hours. Just two days before, a Light-mantled Albatross had been spotted on one of her trips. "A first North American record," she said. "Actually, probably a first northern hemisphere record."

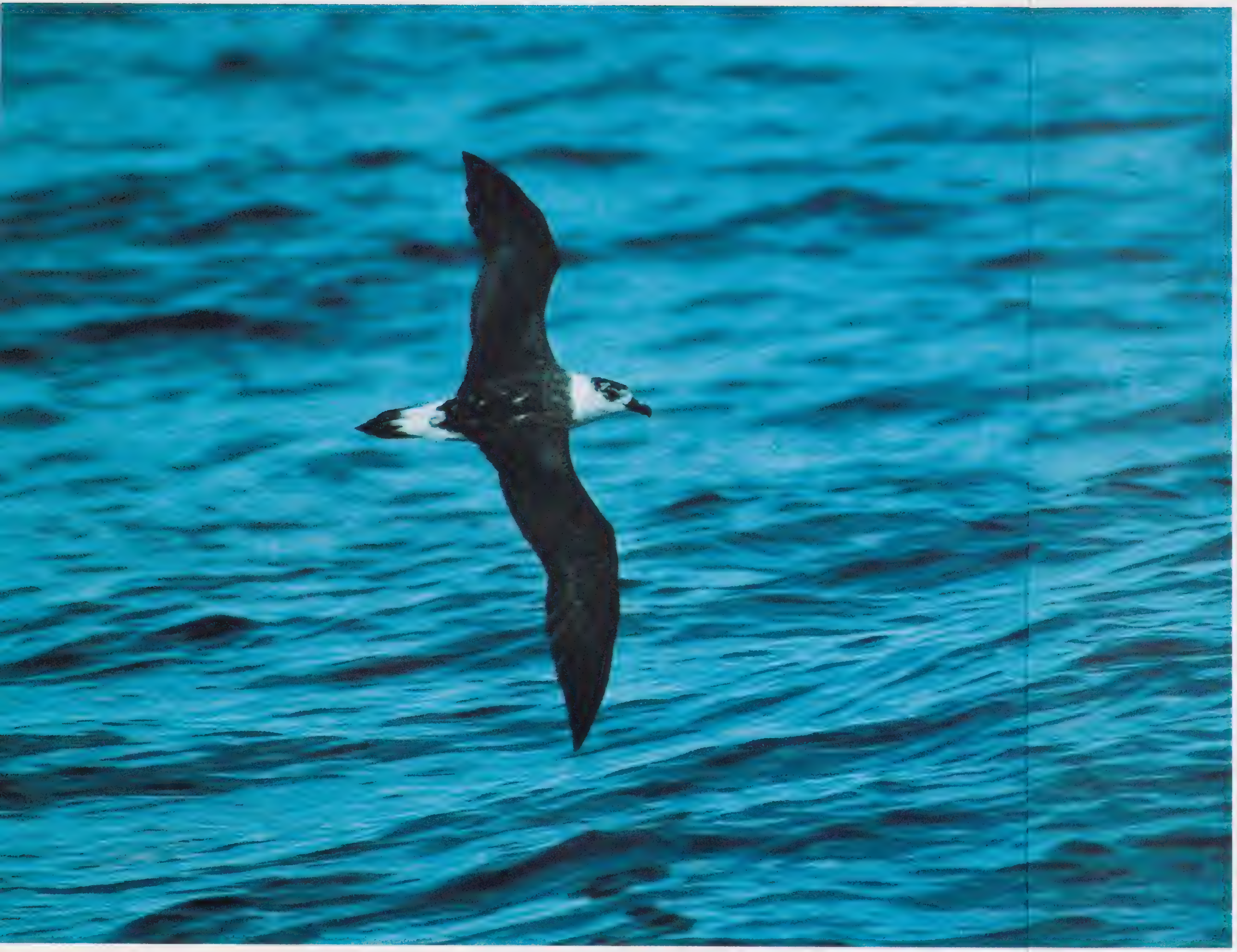
Not every pelagic trip turns up such a record, but it is certainly several times more likely to happen at sea than on an average birding excursion on land. Shearwater asserts that the best place in the United States to find new birds is aboard a pelagic trip, specifically one to the Cordell Bank, an area with an intense concentration of nutrients, and therefore birds.

"Twenty-two miles offshore, out of Bodega Bay, there is a bank . . . a shallow area surrounded by deep water," she says.

Understanding topographic features such as the Cordell Bank and oceanographic features such as the Gulf Stream figures highly in the planning of any pelagic birding excursion, be it off California, Texas, or North Carolina. Though the open ocean may seem flat and featureless, pelagic birds depend on habitats formed by submarine canyons, the continental shelf, prevailing currents, and other underwater and surface features.

Learning the significance of the various ocean habitats is only one lesson in a pelagic birder's education. You also need to know which species are true pelagic birds and why. Cormorants, pelicans, and loons are all considered seabirds, but only birds that avoid land and shallow water outside of the breeding season have earned the appellation pelagic. Unfortunately, this classification is not completely cut-and-dried: one expert's pelagic bird may not be a true pelagic to another.

The third lesson in the Pelagic School of Hard Knocks (and Big Waves) is field identification. Aboard a heav-



BRIAN PATTESON

If the able captain can maneuver close, the bird that was once a bland depiction in a field guide becomes real and unforgettable

If you want to build up your North American life list, try taking a pelagic birding trip, above right. You never know what you'll see next. Black-capped Petrels like this one, above left, are spotted regularly on trips off North Carolina.

SAM FRIED

ing boat, most birds, it seems, always show up on the opposite side of the boat from you. By the time you stagger over, jockey for position, and find your eyes with your binoculars (your balance is askew—the binoculars go first to your eyebrows, then to your chin), the unfamiliar bird is often little more than a diminishing speck. But other times the able captain can maneuver close, and the bird that was once a bland depiction in a field guide becomes real and unforgettable.

"Still, it may take twenty to thirty trips to truly learn your pelagic birds," says Patteson.

Those who do learn their pelagic birds form an elite network of hopelessly addicted seafarers whose obsession benefits both the birding and the scientific communities. The deep waters of the Gulf of Mexico, for example, had been largely overlooked until several crack birders began searching out the areas richest in pelagic life.

"For years we'd been concentrating on water only 200 meters deep," says Dwight Peake, an emergency room physician from Galveston, Texas. "But now we're discovering the true zone for pelagic birding in Texas—the water must be 600 meters deep or more."

To reach these waters, and to spend six hours in this productive zone, a bird-watching vessel must leave port at 4:15 A.M. and be at sea for 17 hours. Experts such as Dwight Peake, Ronnie Carroll (the dean of pelagic birding in Texas), and Mark Elwonger (the force behind the organization of these birding excursions), discover something to add to Texas ornithology each time they venture out. Like other experts along the various coasts, these de facto researchers and educators submit their findings to local and regional bird records committees and follow up with papers in bird journals. For most, however, the goal is not to become an expert, but just to have an opportunity to glimpse and appreciate the mysterious lives of pelagic birds.

On a typical East Coast trip, you'll usually find novice pelagic birders lying on a bench in the boat's cabin, deep in a Dramamine-induced sleep. When someone shouts "Northern Gannet!" (or any number of other seabird names), they bolt up and stumble to the door, fumbling with their binoculars. Nothing raises a birder from a coma like the chance to see a new species. This is what birding on the open seas is all about.

But it's also about science. On the bridge, Todd Hass can do an organized transect across the Gulf Stream, using stringent scientific methodology. "I observe only one side of the vessel, and record only the birds I see in that area." he says. "Later, using my computer, I superimpose the day's data on the position of the Gulf Stream as determined by satellite images of the sea-surface temperatures on the particular day." In this way, Hass can examine the distri-

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bution of pelagic seabirds around North Carolina's Cape Hatteras in relation to the Gulf Stream.

Off the Washington coast, Terry Wahl, whose long-term interest led to a vocation as a seabird researcher, is also collecting data aboard pelagic excursions. "Because there is no reliable source of funding for intense scientific investigation of the open ocean lives of seabirds," says Wahl, "the vast majority of what is known about their offshore distribution in this area is collected from bird-watching boat trips. We have the only long-term data for this area."

BRIAN PATTESON

Pelagic birding tours have been a boon for ornithology. Much of what we know about the offshore distribution of pelagic species is based on data gathered on these trips. Every pelagic bird is a rarity for a land-locked birder, but on summer trips off the coast of North Carolina, Audubon's Shearwaters, left, and Wilson's Storm-Petrels are fairly common.

Wahl started organizing pelagic birding trips in 1966 and began collecting data in an organized way in 1971. These data not only document true rarities, but also provide solid information on regular visitors that were once considered scarce. Before he started collecting data, only one record each existed for the Flesh-footed Shearwater and the Buller's Shearwater. "Since we started collecting data in 1971, we have seen occurrences, in flocks or individuals, of 198 Flesh-footed Shearwaters and 400 Buller's," says Wahl.

Data kept over the long term like this demonstrate year-to-year variations in occurrence and abundance in relation to local conditions. This information is vital for bird conservation. "The data collected aboard our trips have been used by conservation agencies anticipating oil exploration," says Wahl.

The threat of oil development haunts the nightmares of seabird researchers. Oil can damage the plumage of seabirds, and it can also contaminate their food supply. Todd Hass worries about oil exploration off Cape Hatteras. "For at least two birds, the Black-capped Petrel and the Audubon's Shearwater, we have a substantial fraction of their population pass through the area," he says. "If the area were somehow contaminated, it could jeopardize their world population."

He also worries about a rare but seemingly regular species that has drawn listers to Cape Hatteras for the past few years. Since 1991, Cape Verde Island Petrels have been identified several times in late May and June. This petrel, part of the Soft-plumaged Petrel complex, breeds off the northwest coast of Africa. Only 300 to 400 breeding pairs are known to exist. "To have such a rare bird identified as a regular part of the region's fauna could be important if the threat of oil development continues," says Hass.

For landlocked birders, every pelagic bird is a rare sight. By the time their boat returns to port, most are already planning another excursion. (With the most seasick birders, however, this planning does not begin until their queasiness is replaced by the vivid recollection of 10 tiny Dovekies shooting past the starboard bow.) Knowing that indulging your hobby also contributes to bird conservation and the science of ornithology will double your pleasure on any pelagic birding trip. Just be sure to bring your seasick pills. ■

Freelance writer Kristi G. Streiffert is currently based in Coulee Dam, Washington. Her article, "Life Histories: Past, Present, and Future," appeared in the Autumn 1993 issue of this magazine.

The American Birding Association publishes an extensive listing of North American pelagic birding tours each year in the January issue of its newsletter, Winging It. *To receive a copy, send $2.00 to ABA Sales, Box 6599, Colorado Springs, Colorado 80934.*

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Their Status and Distribution

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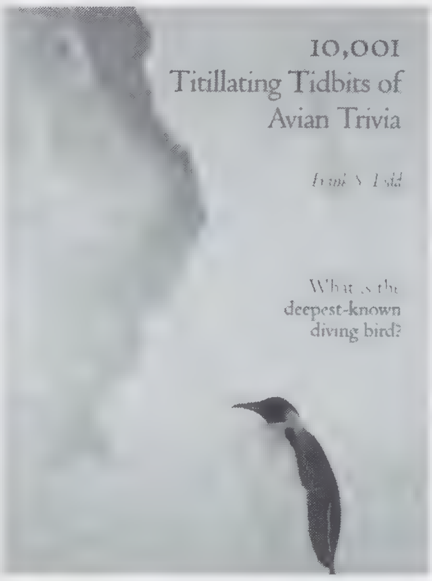

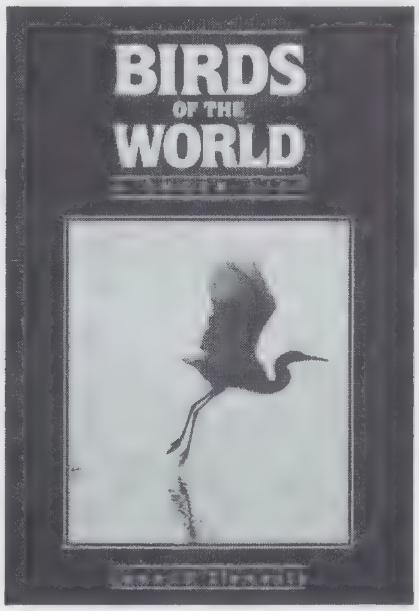

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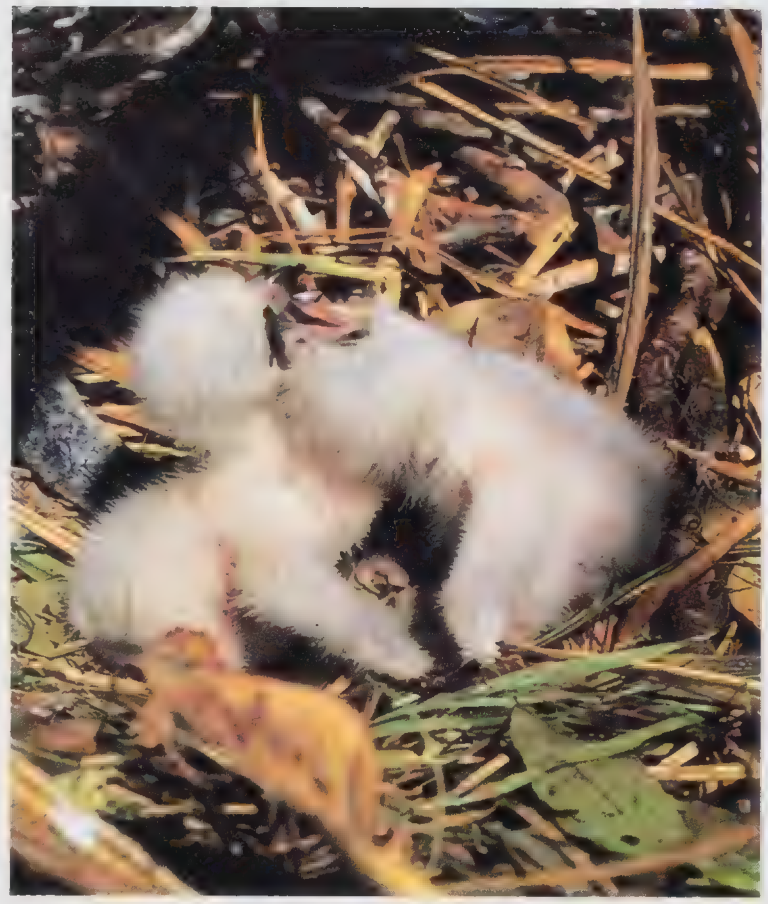
RICHARD T. WATSON

Raising Cain . . . and Abel

BY DONNA O'DANIEL

A low-cost, low-tech management technique offers new hope for the critically endangered Madagascar Fish-Eagle

Near fledging, a young Madagascar Fish-Eagle sits in its lofty treetop eyrie. At right, an eaglet pecks its nestmate. In this rare species, the smaller of two chicks produced each year invariably falls victim to siblicide.



SIMON THOMSETT

SEPTEMBER 28, 1993; MADAGASCAR—I peer through the spotting scope at the nest, my eye riveted on the young fish-eagle poised atop the fence installed to protect it from its larger sibling. As I watch in horror, the bird jumps to the other side of the partitioned nest, where its nestmate and its mother are feeding on a fish. Obviously ravenous, the bird grabs the fish away and rips into it voraciously. My mind races. I'm watching one of the rarest raptors in the entire world, a species in which the smaller of two nestlings almost always perishes—the victim of sibling aggression and parental neglect. And yet now, despite our efforts to keep them apart, the young eagles are together. How will the adult eagle react? Will the eaglet's sibling attack? If so, what can I do to rescue this irreplaceable bird?

I had come to Madagascar in the fall of 1993 to work with The Peregrine Fund on their Madagascar Fish-Eagle and Wetland Conservation Project. The group had been studying the eagles for two years at that point, trying to design a recovery program for the species. During my stay on Madagascar, I watched one of the eagle nests until the young fledged.

Found only on this small island nation, the Madagascar Fish-Eagle is a relative of the American Bald Eagle. But unlike this more common North American

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eagle, the fish-eagle's entire population consists of fewer than 100 known pairs. The bird's range is limited to the central and northwest coasts of Madagascar, where presently only three pairs are benefiting from habitat protection programs. Though it is one of the rarest diurnal raptors in the world, few of the indigenous Malagasy people are even aware of the species' existence.

The Peregrine Fund trained local people to help with the fish-eagle project. These Malagasy men, above, cover miles of habitat on foot as they search for nests. Walking or paddling an inflatable kayak is often the best way to get around in the remote study area.

JAMES BERKELMAN

The fourth largest island in the world, Madagascar has a remarkable number of endemic species—plants and animals found nowhere else on Earth. Many of these species depend on the rapidly diminishing forest and wetland habitats that, until recently, covered a large part of the island. Now less than 20 percent of Madagascar is forested, and only about 4 percent of that is primary growth, the habitat most suitable for endemic species. Few if any wetlands remain undisturbed. Subsistence farmers have cut down broad tracts of forest and converted wetlands to rice paddies, causing massive soil erosion and siltation of rivers and lakes. The process is spiraling out of control and now even the rice paddies that the Malagasy depend on for food are threatened.

This ecological destruction is also devastating for the fish-eagle. Deforestation adjacent to wetlands ruins nesting habitat; deforestation in river catchments many miles away causes soil erosion, which clogs rivers, lakes, estuaries, and coral reefs with silt, destroying foraging habitat and the fish the birds depend on for food. Converting wetlands to rice paddies also makes areas unsuitable for fish-eagles. Add to these factors deliberate human persecution—shooting, destroying nests, killing eaglets—and the outlook for the Madagascar Fish-Eagle is grim. The small population size and clumped distribution of this endemic species make it extremely vulnerable to extinction, both from these human-caused factors and from catastrophic natural events such as hurricanes and disease outbreaks.

Since 1988 the Madagascar government—aided by international conservation organizations—has been engaged in a massive effort to save the country's unique habitats, which include an area of wetlands in the west, home to probably the greatest concentration of Madagascar Fish-Eagles on the island.

Cooperating with the country's government since 1990, The Peregrine Fund provides hands-on training to Malagasy personnel, working closely with them to conserve biodiversity and encourage a sustainable use of their natural resources. The group's goal is to help establish Madagascar's first wetland Biosphere Reserve, which would include an endangered species management program for the Madagascar Fish-Eagle.

Several days after I arrived in the capital city of Antananarivo, I flew west to the small town of Antsalova. The Peregrine Fund had surveyed the area in 1991 and found sufficient numbers of breeding fish-eagles to choose it as a study site for researching the biology and ecology of the species. Bordered by the Soahany River to the north and the Manambolo River to the south—an area approximately 3,000 square kilometers in size—the Antsalova region is home to the Sakalava Tribe. With their help, The Peregrine Fund found 27 eagle pairs, doubling the number of known nesting pairs in the area.

The ongoing census, conducted by young Malagasy men, has provided the most accurate data ever collected on the eagles' distribution and abundance. Within the Antsalova region, field workers found concentrations of fish-eagles on three neighboring lakes. They set up a base camp for the fish-eagle census and studies of the breeding biology, ecology, and experimental management of the species.

From Antsalova I traveled to the field camp—a grueling, five-hour journey in a four-wheel-drive pickup, over roads that were primitive at best and nonexistent in some areas. I was relieved when the excruciating trip to the lakes was over.

Suzanne Razafindramanana, a University of Madagascar graduate student, greeted me as I arrived at the lakeside camp. Suzanne is studying the breeding biology of the fish-eagle under the guidance of Rick Watson, The Peregrine Fund's Madagascar project director. I appreciated the warm welcome Suzanne provided. She was the only Malagasy in camp who could speak English, and she made me feel at home.

The Peregrine Fund's fish-eagle studies confirmed the occurrence of siblicide in the species. The Madagascar Fish-Eagle usually lays two eggs, but because of siblicide—the "Cain and Abel" phenomenon, in which the older and stronger of two nestlings displaces or kills the second chick—only one eaglet fledges from each nest.

In 1993 The Peregrine Fund launched "Abel Rescue," a low-cost, low-tech management technique designed to increase the fish-eagle population by saving the smaller eaglet in each nest. As soon as both chicks hatched, researchers would remove the older chick from the nest and raise it in captivity for several weeks, allowing the smaller chick to grow unhindered by its larger, more aggressive sibling. The eaglets would then be switched every 10 days or so, giving them both a chance to imprint on their parents. The researchers enlarged several nests and erected a low fence down the middle of them. Both eaglets would be returned to their nest when they were approximately four weeks old, but they were separated from each other by the artificial partition. We monitored all the nests intensively to make sure that both eaglets were being fed by their parents and were developing properly.

For 12 days, between September 17 and October 4, 1993, I stood watch at an Abel Rescue nest containing two well-developed fish-eagle nestlings. Almost fully feathered, the birds flapped their wings frequently—at first holding onto the nest and staying in place; later hovering briefly a few inches over the nest, indicating that they were close to fledging.

I noticed a difference in the behavior of the chicks almost immediately. One nestling called almost constantly, while its sibling rarely made a sound. Dur-

SIMON THOMSETT (3)

A curious eaglet, above, hitches a boat ride to camp. Chicks are fed by hand at first, at left, but as soon as they're mature enough to tear up their own food, they're left to feed alone. Researchers swap the eaglets with their nestmates every 10 days to avoid human imprinting. Below, a kerosene brooder keeps the chicks warm at night.

> *As I think back on those days I spent on that island, I hope with all my heart that the efforts to save the Madagascar Fish-Eagle, along with its entire ecosystem, will be in time*

ing the first 10 days I watched, the adults visited the quieter bird four times more frequently than the other nestling and provided it with twice as much food. The vocal eaglet was simply not getting enough to eat.

When this eaglet jumped over the partition into the other side of the nest and started feeding, the bird's sibling and its mother just looked on quietly. After two minutes or so the adult eagle flew from the nest. I didn't see any aggression between the nestlings. For the next two days, I watched the nest from dawn to dusk to document the chicks' behavior and to be ready to intervene if one eaglet pushed the other from the nest.

As it turned out, I had no cause to worry. On their first day together the two young eagles sparred with their beaks a little, but by the second day, they were feeding calmly side by side. Watching the two eaglets together was fascinating. I wondered whether this was one of the first times that two young Madagascar Fish-Eagles had ever shared a nest all the way to fledging.

Through simple techniques such as Abel Rescue, Peregrine Fund researchers believe that they can steer the Madagascar Fish-Eagle back from the brink of extinction. Increasing the species' distribution and abundance is vital, as is promoting a public awareness of the need to protect the eagles and their habitat. Involving the local Sakalava Tribe in our work was a step in the right direction. We learned a great deal from them and have earned their trust and support. They seem to have a strong conservation ethic. The villagers who live along the study lakes follow traditional fish harvesting limits, enforced by the local Tompandrano—the keeper of the lakes. And they coexist with perhaps 20 percent of the entire Madagascar Fish-Eagle population. As the primary users of this wetland's resources, these villagers have the desire and, with help in coming years, the capacity to be guardians of the wetlands.

A lone young eagle peers out from its nest, above left. Before "Abel Rescue" each fish-eagle nest produced only one fledgling. Above, a Peregrine Fund biologist enlarges a nest to accommodate two eaglets.

RICHARD LEWIS (2)

After completing my watch each day, I returned to camp and enjoyed a long evening around the campfire, watching the darkness settle softly on the lake, mirror calm after the afternoon winds died down. The variety of wildlife I saw from camp was amazing. African Openbill Storks, Glossy Ibises, and Madagascar, Grey, and Purple Herons foraged on a small islet in the lake, barely 100 meters away. A flock of White-faced Whistling Ducks milled about with Comb Ducks and a few Red-billed Ducks and Black-winged Stilts. A resident crocodile lay like a statue for days on end.

Evenings by the campfire were lovely, as African Hoopoes softly trilled their last notes of the day and two or three Madagascar Sandgrouse flew swiftly across the lake on whistling wings, headed for their nighttime roost. I drifted to sleep in my tent each night hearing the haunting calls of a Madagascar Hawk-Owl and a Madagascar Nightjar and the grunts of foraging brown lemurs.

As I think back on those days I spent on that island—so remote, so beautiful despite the damage it has already suffered—I hope with all my heart that the efforts to save the Madagascar Fish-Eagle, along with its entire ecosystem, will be in time. ■

Donna O'Daniel is a freelance writer and wildlife biologist who enjoys working in remote places. In addition to her stint on Madagascar, she has participated in studies on Midway Atoll, Johnston Atoll, and the Aleutian Islands, and she is currently on Tinian Island—a Pacific island in the Marianas near Guam—where she is working with endangered birds, sea turtles, and fruit bats.

For more information about this group's projects around the world, write to The Peregrine Fund, Inc., World Center for Birds of Prey, 5666 West Flying Hawk Lane, Boise, Idaho 83709.

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Critics' Corner

OUT OF AUSTRIA

TIM GALLAGHER (2)

SWAROVSKI ST80 HD SPOTTING SCOPE

In our last major scope feature ("A Birder's Guide to Spotting Scopes," Spring 1994), Lab reviewers said that the Swarovski ST80 was a good product, one of the most "eyeglass friendly" spotting scopes we tested. "Though the Swarovski is a little darker and fuzzier than the others at 60X," wrote Tim Gallagher, "the field of view is incredible—almost twice the field of view at that power as the others have." On the down side, however, reviewers lamented that this scope was not available with ED (Extra-Low Dispersion) or fluorite glass, because either feature would enhance image clarity and color transmission. Now, with the recent introduction of the HD (High Definition) model, Swarovski Optiks of Austria has a product that rivals or surpasses the best scopes in its class.

This scope is excellent: Its optical quality is as sharp and bright as the top-of-the-line Kowa TSN-4 and the Bausch & Lomb Elite 77mm ED scopes, but with a noticeably wider field of view than these scopes offer. This wide field of view, combined with the product's superb eye relief when used with its excellent 20X-60X zoom, is especially impressive for eyeglass wearers (like me).

The best feature is the extra-wide field of view at high power. You see virtually no loss of the total field of view as you zoom from 20X to 60X. When you use a 20X-60X zoom lens with the other two scopes mentioned, you seem to be looking through a narrower and narrower tunnel as you zoom above 30X or 40X.

The Swarovski ST80 HD's combination of high power, sharp image, and wide field of view simply is not available in any other scope of its class. My only complaints are that I don't like the large focusing collar on the barrel of the lens—I prefer small focusing knobs like those on most other top scopes, which seem to create less lens shake when you're focusing—and that the price is on the high side at $1,438 (it does include the 20X-60X eyepiece). If you're shopping for a new scope, you should definitely take a look at this one. I recommend it highly.

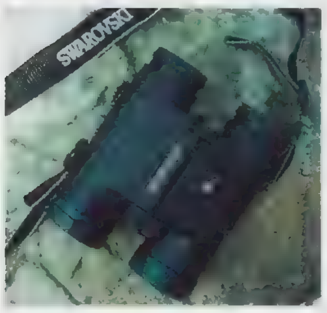
— *Ken Rosenberg*

SWAROVSKI 8X30 BINOCULARS

We frequently receive letters from readers who are looking for good, mid-size binoculars for birding. These are birders who don't want to lug around a heavy, cumbersome pair of 10Xs in the field all day (or pay the whopping purchase price), but say that the compact binoculars they've looked at are too small and flimsy for comfortable, all-day viewing. Swarovski Optiks may have just the answer in their recently redesigned 8X30 binoculars.

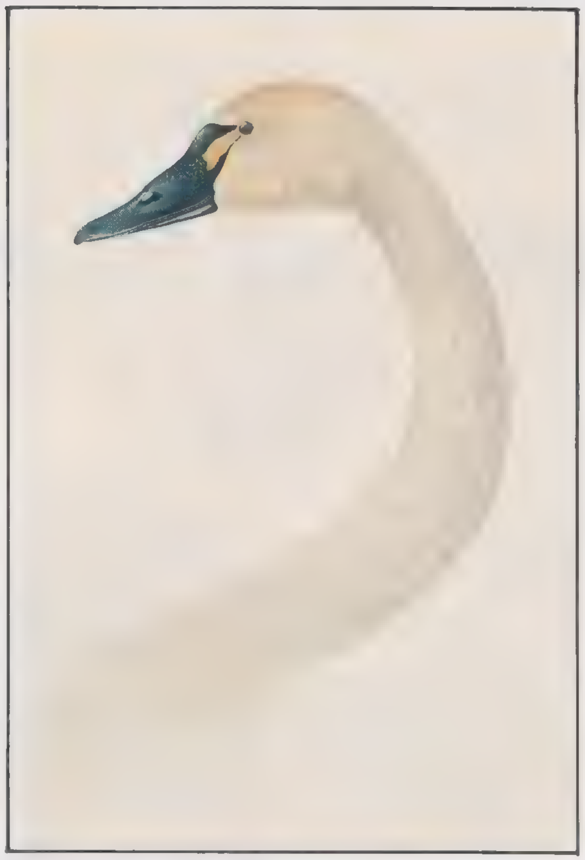
Optically, these binoculars are superb, providing a crisp, bright image in average lighting conditions. They're comfortable to hold—large enough to be steady, but not heavy enough to cause fatigue—and they're contoured to fit the grip of an average birder. The eyecups have been improved; instead of the folding rubber kind, they now have the kind that pop in and out, similar to those used on Leica Ultras. The focusing mechanism is toward the front of the binocular, which I liked as soon as I got used to it.

According to the manufacturer, the 8X30s have been completely waterproofed, gas-filled, and then immersion tested, rendering them virtually impervious to weather. (Though we did not test these claims at the Lab yet, stay tuned for our next major binocular roundup and review; we'll put these and every other binocular model we can get our hands on to the ultimate test.)



As in all binoculars, the number after the X refers to the size in millimeters of the objective (front) lenses—for example, the 8X30s have 30-millimeter objective lenses. Naturally the 8X30's more expensive cousins, the Swarovski 7X42 and 10X42 binoculars with their 42-millimeter objective lenses, let in more light. But the only time you'll notice the difference is when you're birding in poor light conditions, such as at twilight or when you're in dense, dark woods.

These binoculars are a wonderful product. Though I'm not quite ready to give up my 10X binoculars (I feel I need the extra power for hawk-watching, my most frequent birding activity), for general birding in reasonably decent lighting conditions, the Swarovski 8X30s would be hard to beat. At a suggested retail price of $665, they're not inexpensive but cost significantly less than the company's 10X42 binoculars. —*Tim Gallagher*



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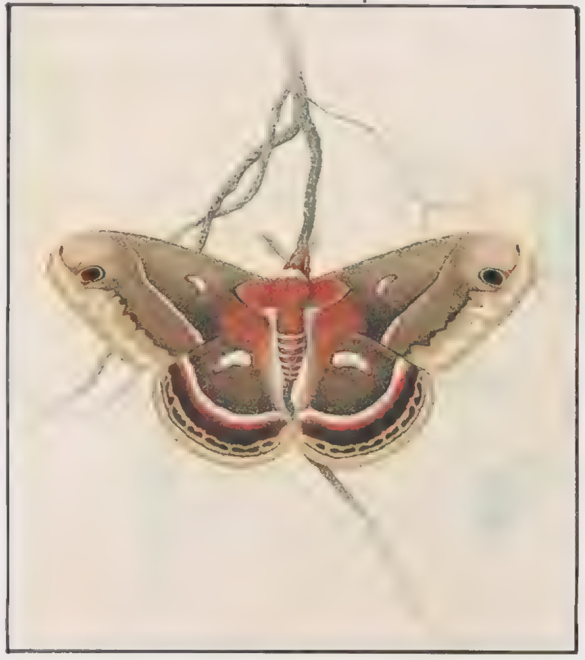

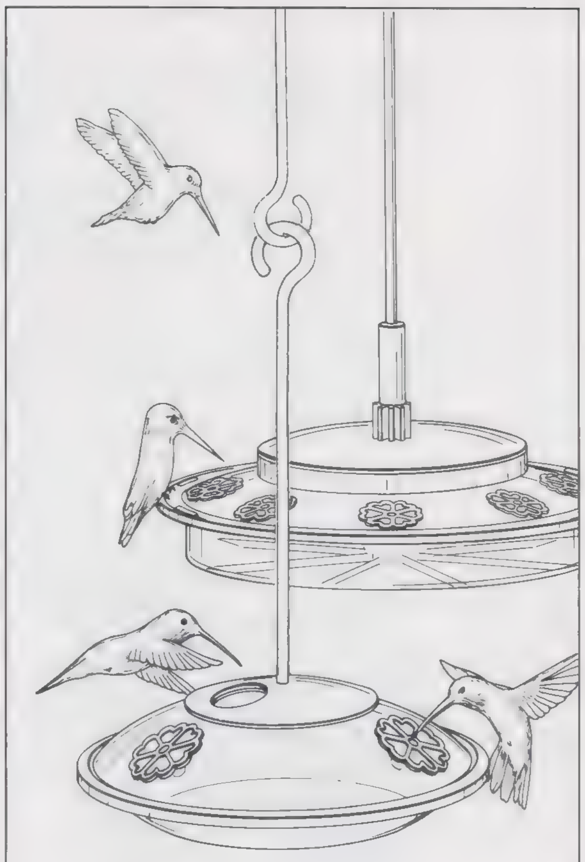

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ETERNAL ERRORS

by Pete Dunne

"Hello," the somewhat hopeful voice on the telephone intoned. "I'm with (she gave the newspaper's name) and I'm calling about . . ."

"The photo on the cover of your bird festival insert that's labeled 'Double-crested Cormorant' but is really a male Anhinga?" I interrupted.

"Then it's true?" she asked.

"We've been laughing about it all morning," I said, cheerfully.

"Oh NOOOoooo," she wailed. I could certainly understand her discomfiture. After all, a bird that you misidentify in public is a temporary embarrassment, but published boo-boos are forever.

Sometimes the root of these misidentifications is simple ignorance—like the Anhinga approved by an editor on staff, or like the illustration that accompanied an ad for Alaska's Cordova Shorebird Festival in 1993. Intrigued by the festival's choice of an apparent "thick-knee" instead of a shorebird species more representative of coastal Alaska, I phoned the Cordova Chamber of Commerce to gain insight into the selection process.

"Oh, we have them here," a very friendly voice assured me.

"I don't think so," I said.

Her assurance undermined, the Chamber representative said that she would talk to the ad's designer and get back to me—which she did.

"Yes," she announced, "we do have them here."

"Have what?" I asked.

"Curlews," she said.

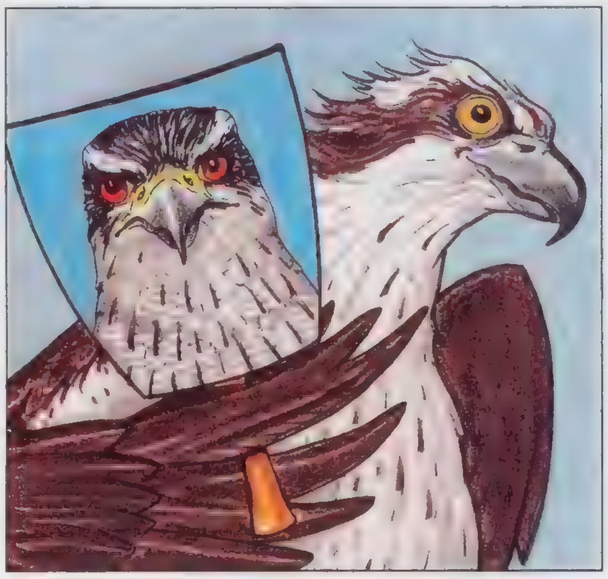
"Yes," I agreed, finally understanding. "You have Bristle-thighed Curlews and 'Hudsonian' Curlews, but not *Stone* Curlews. That's an Old World species."

"Oh," she said.

Sometimes the boo-boos are rooted not in ignorance but in a moment's carelessness. One of my favorite faux pas involved an article that appeared in an eastern Pennsylvania newspaper extolling the merits of the year's Osprey migration at famed Hawk Mountain Sanctuary.

"One of the best migrations in memory," the columnist wrote, "evidence that the birds are making a comeback."

All this was verifiably so. The discord had nothing to do with the copy, but with the photograph accompanying the article—a photograph that I carefully (and gleefully) clipped and sent to my friend, Hawk Mountain Curator Jim Brett, along with the observation that the year's Osprey migration was probably among the latest as well as the finest—provided that the head shot of the adult Northern Goshawk accompanying the article was representative of the Ospreys they'd been counting.



I've been a party to a few printed indiscretions myself, of course. Among the finest was an article I penned about the Salton Sea in which I habitually referred to Yellow-*legged* Gulls instead of the indigenous Yellow-footed Gulls.

But my all-time prize-winning misprint was the mess-by-committee committed against the first edition of *Hawks in Flight*. In the page proof stage, co-authors Clay Sutton, David Sibley, and I noted that on the illustration covering large falcons, the Peregrine and Prairie Falcons had been mislabeled—a problem that we tried to correct with a call to the publisher. The gremlins won anyway. When the book was published, not only were the Peregrine and Prairie Falcons mislabeled, so was the Gyrfalcon.

Perhaps the most hilarious insult to accuracy I've ever witnessed related not to an article but to a video. A birdseed company, hoping to secure an endorsement from the American Birding Association, sent a promo tape that was aired at a meeting of the Association's board of directors. At one pregnant moment, a House Finch appeared full-frame on the screen, threw back its head and, to everyone's eternal amusement, belted out a beautiful Mourning Warbler song.

The members of the board almost ruptured their collective diaphragms. Needless to say, the company did not get the endorsement.

Back to the Anhinga. "It's no big deal," I assured the distraught young caller. "These things happen all the time."

"Oh, but it is a big deal," she said. "This photograph was a contest winner, and our contest rules state that only photographs taken in Cape May County, New Jersey, are eligible. And Anhingas aren't found here, are they?"

"Not commonly," I agreed.

"But sometimes," she said, grasping the short straw.

"Yes, sometimes," I confirmed. "There are four records for the county."

"Then the photographer *could* have taken the picture here."

I didn't say anything for a moment. I thought about saying yes; I thought about saying nothing; then I told her the truth.

"Not likely," I said. "The bird is sitting in a mangrove tree and mangroves aren't native to Cape May either."

"OOOOoooo," she said. ■

ILLUSTRATION BY JEFF SIPPLE

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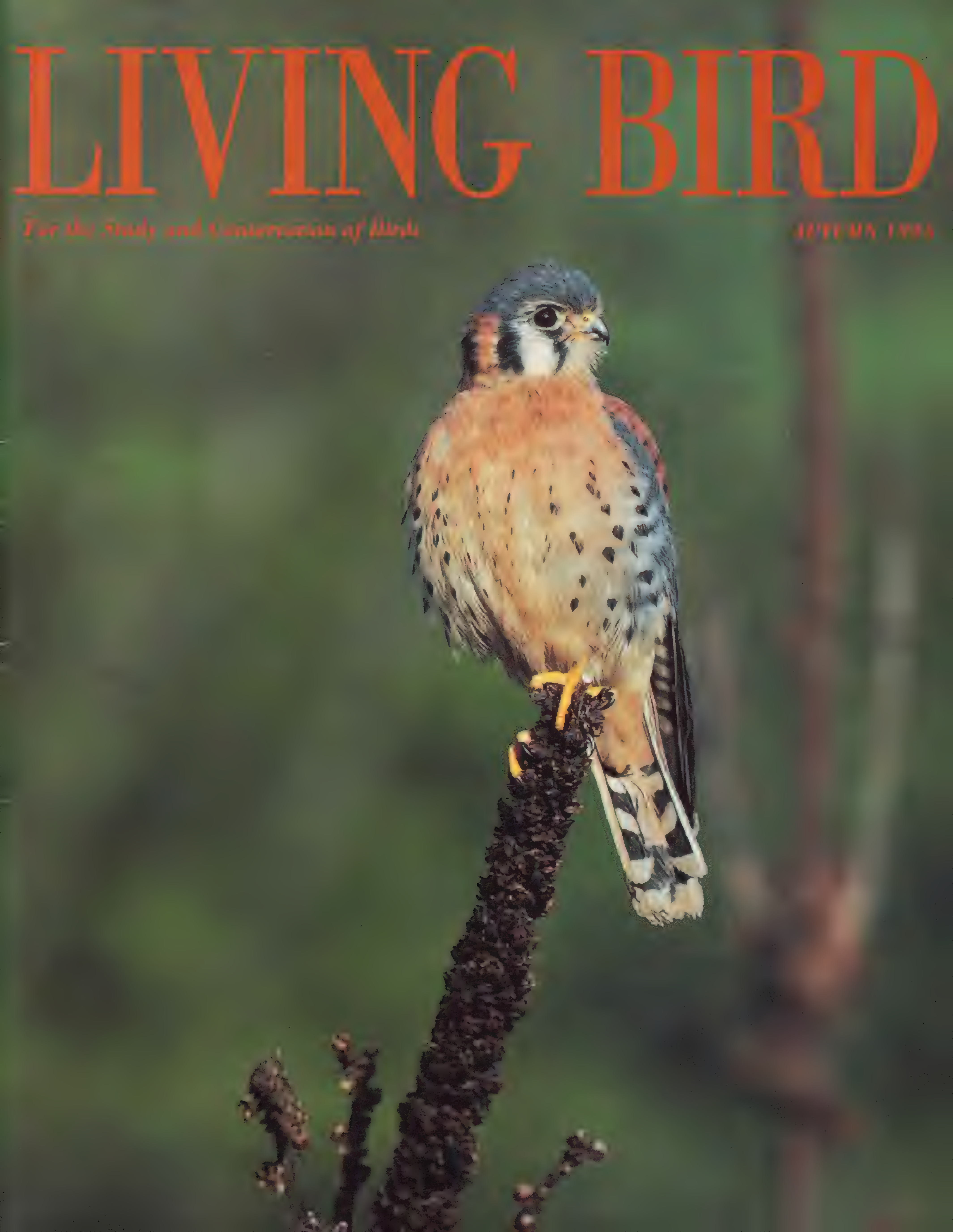

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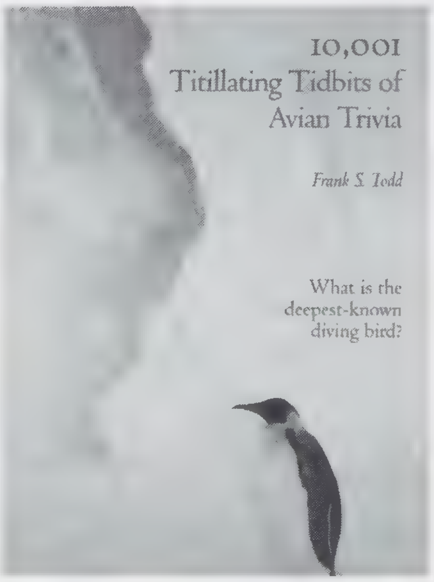

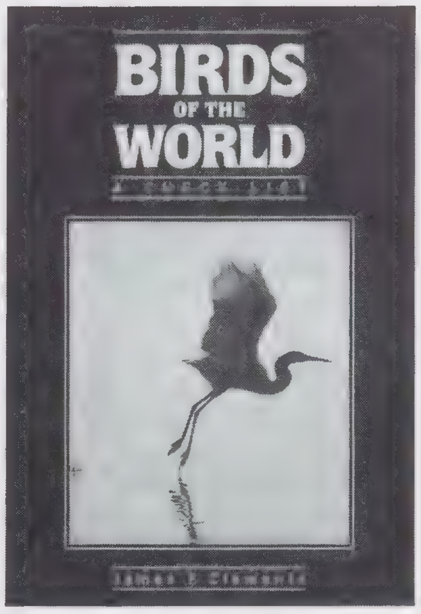

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LIVING BIRD

AUTUMN 1995 VOLUME 14 NUMBER 4

GREETINGS FROM SAPSUCKER WOODS

Looking out my office window I see that the leaves are turning slowly from the bright, uniform green of summer to a blazing patchwork of red, yellow, and orange. Autumn is always a time of profound change at Sapsucker Woods—a time when the birds of summer depart en masse to points south, trying to escape the approaching onslaught of winter. The changes taking place here this autumn are particularly significant as we welcome John Fitzpatrick, our new director, and bid farewell to Charles Walcott, who served in that position for 14 years.

Though Charlie's many contributions to this organization have been acknowledged in other Lab publications, he deserves an extra note of thanks in *Living Bird.* One of his first acts when he became Lab director was to change *Living Bird* from an annual scientific publication into a quarterly magazine aimed at a popular audience, a move that greatly expanded its appeal and drew thousands of new members to the Lab of Ornithology. Dedicated to the concept of public education and participation in science, he encouraged his staff to develop projects that would involve amateurs in meaningful scientific research—a hallmark of Lab programs ever since. Charlie Walcott will be greatly missed.

We are fortunate to have an ornithologist the caliber of John Fitzpatrick as Charlie's successor. An eminent scientist and dedicated conservationist, John brings boundless enthusiasm and ambitious plans for future growth to the Lab. He intends to expand the scope of existing Lab programs and establish major new programs in conservation and bird systematics, all of which will have opportunities for amateur involvement.

To introduce John, we're featuring an article in this issue of *Living Bird* ("He's Also a Bird Watcher") and another in our sister publication *Birdscope* ("Blueprint for Bird Study"). Please join us in welcoming him aboard.

—Tim Gallagher
Editor-in-Chief

Cover: Perched nimbly on a plant stalk, a male American Kestrel basks in the warm light of an autumn afternoon. These small, colorful raptors are a common sight as they hover above open fields, hunting for insects, mice, and other prey. Photograph by John Hendrickson.

Right: Wearing identifying bands on its legs, a Florida Scrub Jay perches on a post in a study area. The Lab's new director, John Fitzpatrick, has studied this threatened subspecies for more than 25 years. Article on page 10. Photograph by Donald M. Jones.

Back Cover: Bosque del Apache Refuge draws Sandhill Cranes by the thousands each fall. Read more about this remarkable human-engineered wetland on page 14. Photograph by G.C. Kelly.

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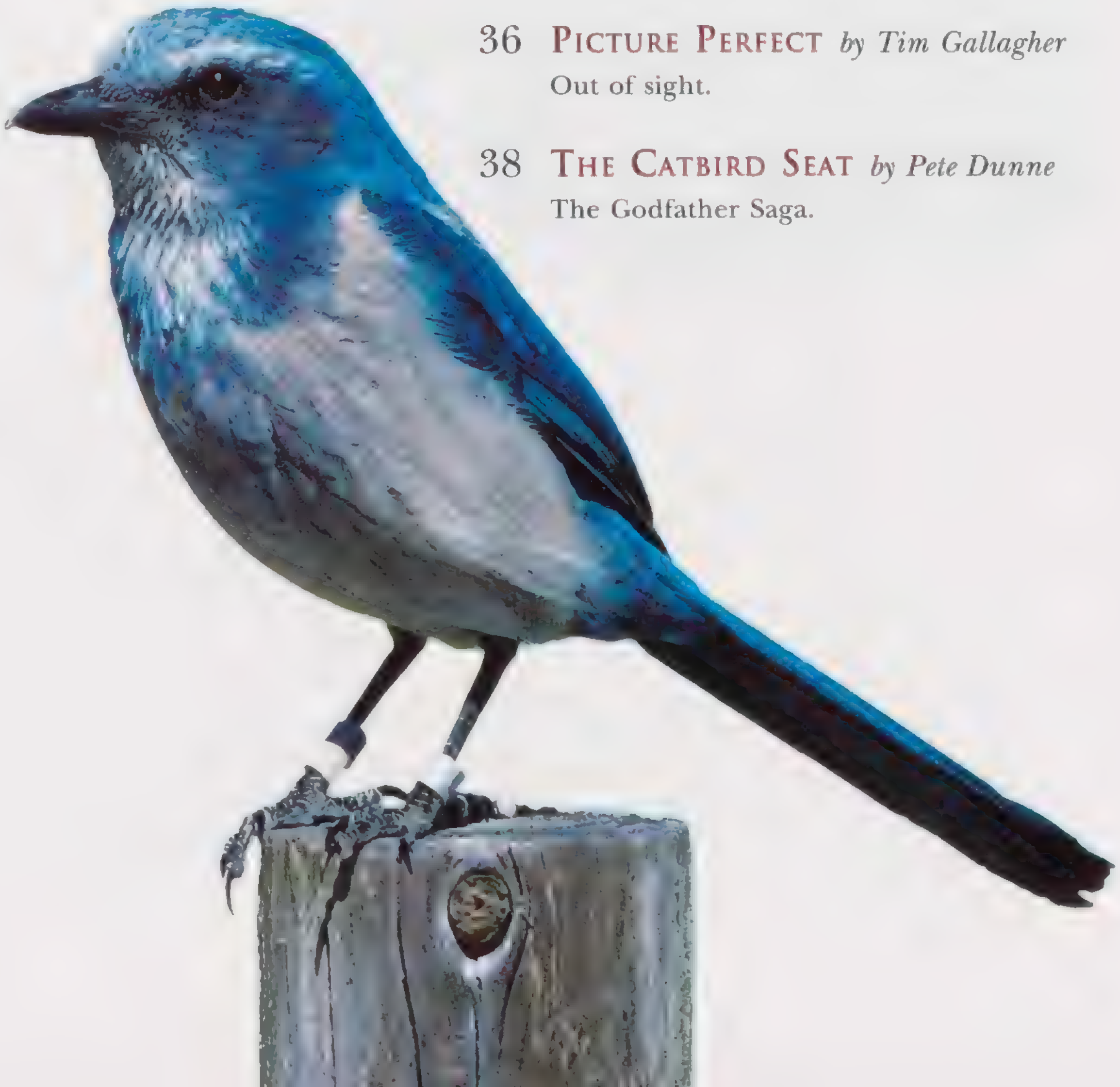

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Letters

WOODEN FEEDERS WORK

Sheila Buff is wrong to tell people to avoid wooden feeders ("Bird Feeding Basics," Winter 1995). As a manufacturer of wooden bird products, I receive few letters about squirrels destroying feeders. A wooden feeder is no more susceptible to squirrel attacks than one made of plastic. Sooner or later a squirrel will get past your baffles, no matter how ingenious. A squirrel will damage a feeder when it wants a mouthful and all it can get is a nibble. A feeder with a 3/4-inch square opening running the length of the feeder will provide sufficient seed flow to satisfy most squirrels. Loss of seed is preferable to the loss of the feeder.

Furthermore, wooden feeders do not breed microorganisms. Wood fibers in products such as butcher blocks contain chemicals that naturally destroy bacteria. Take a culture from a just-washed plastic butcher block, however, and watch the microorganisms grow.

A good wooden feeder, made with boards at least 5/8-inch thick and assembled with screws, will last as long as one made of plastic. Feeders assembled with staples and nails are budget items not aimed at the serious birder. Most feeders need replacing within five years anyway. Because of this short life span, wood should not be a major part of your purchasing decision.

I also dispute the description of the counterweighted feeder as squirrel-proof. Two years ago the Discovery Channel ran a program from England that showed squirrels outwitting every device on the market. One squirrel sat on the counterweight while the other squirrel ate.

Ms. Buff also suggests that a feeder should have a minimum capacity of two quarts. Although a big feeder offers convenience, it also means a large amount of seed will be wasted due to spoilage. And a large feeder is a significant investment. Consumers purchase feeders because they appeal to their taste and budget, not because of their capacity.

Studying animal behavior is only a small part of designing bird products. Consumer feedback offers the largest source of knowledge.

Steve Edwards
Feathered Tweets
Peacham, Vermont

As Sheila Buff acknowledges, personal preferences and aesthetic considerations often play a large role in choosing a feeder. We feel that her feeder recommendations are sound, but we do not discourage anyone who prefers a wooden feeder from purchasing one.

GOOD GUIDE

In his review of the book *Eastern Birds* by James Coe (Winter 1995) Ken Rosenberg expressed concern that some birds found in eastern states were not included. He felt that beginning birders would be confused or discouraged if they observed a bird that was not in the book.

I disagree. The opposite occurred with me. I was a casual birder from the age of seven, and until I was 25, my only field guide was one that pictured only 100 birds. Then on January 27, 1962, a flock of strange birds appeared at my sunflower feeder. They were not in my bird book. It got me curious enough to go to the library for a Peterson field guide.

How exciting! I had Evening Grosbeaks. That one experience turned me into a birder.

Judie Hansen
Danville, Indiana

We welcome letters from readers. Address letters to: The Editors, *Living Bird,* 159 Sapsucker Woods Road, Ithaca, New York 14850.

PUTTING BABY LAST

As any sleep-deprived parent of a newborn baby knows, conflicts between the needs of parent and child are inevitable. Do parents ever put their own needs first? Leach's Storm-Petrels do, according to Robert Mauck and Tom Grubb of Ohio State University (*Animal Behaviour*, vol. 49, pp. 999-1008; 1995).

Storm-petrel parents work hard, flying far from the nest to round up tasty shrimp dinners for their single chick. Mauck and Grubb "handicapped" some storm-petrel parents by trimming their flight feathers. (At the end of the experiment, the subjects molted and regained their normal flight capacity.) The handicapped birds had to work slightly harder than unclipped parents while flying and foraging.

Would these birds sacrifice for the sake of the chick, contenting themselves with less food? To find out, Mauck and Grubb used an innovative technique called ptilochronology (literally, "feather-dating"). They pulled a tail feather from each parent; then, at the conclusion of the experiment, they pulled the new feathers that had gradually replaced them. By measuring each feather's growth rate they could tell how well the birds had been eating. They also weighed the chicks at regular intervals to track their weight gain.

The researchers found that chicks with handicapped parents gained significantly less weight than chicks whose parents had normal wings—suggesting that the clipped parents were delivering less food. Meanwhile, the handicapped parents remained well fed—they grew feathers just as fast as the controls. Instead of doing without for the sake of the children, these parents were shifting the burden of their handicap to their young.

From a human parent's perspective, this might seem cruel, but to a Leach's Storm-Petrel, it makes sense. These long-lived birds will have many other chances to reproduce. By eating well, they protect their entire lifetime's worth of potential offspring—even if it's at the expense of the young of the year.

UP FOR ADOPTION

Almost half of the White Storks nesting in Andalusia, Spain, "adopt" a young bird from another nest. This behavior seems to fly in the face of the theory of natural selection, which says parents shouldn't waste energy on a youngster who won't pass their genes to the next generation.

So why do some stork parents tolerate an intruder? Spanish researchers say it's due to an ever-escalating "co-evolutionary arms race"(*Animal Behaviour*, vol. 49, pp. 1097-1110).

Initially, the adoptive parents defend their nest from the invading chick by pecking it aggressively. This behavior selects for chicks persistent enough to overcome the defenses. They submit passively to the onslaught until the adults give up and take them in.

These chicks have been pushed out of their home nests by aggressive siblings, so for them, it's a case of "get adopted, or die." The adoptive parents have less to lose; they won't have to feed an extra mouth for long, because chicks that seek adoption are usually just a few days from fledging. Chicks that get adopted are more likely to survive than chicks that can't find a new home. Thus, they pass on their "arms race" behaviors to future generations.

QUESTIONING THE COUNT

TIM GALLAGHER

With more and more CBC participants counting birds at feeders, is the data gathered less accurate?

For nearly a century the venerable Christmas Bird Count (CBC) has collected data on North American bird populations—and given holiday-jaded bird watchers the perfect excuse to get out of the house.

With the increased popularity of bird feeding, however, our Christmas counting habits are changing, according to Erica Dunn, a biologist with the Canadian Wildlife Service. Dunn, formerly Project FeederWatch coordinator, says these changes may be introducing a bias in CBC data (*Wilson Bulletin*, vol. 107, pp. 122-130; 1995).

Traveling on foot or by car, Christmas counters tally birds in fields and forests—and also at any backyard feeders they pass. With more feeders around, there's a greater chance that field parties will count feeder birds. What's more, some CBC participants have taken to counting exclusively from the comfort of home.

When Dunn compared CBC data from 1978 to 1991, she confirmed that increasing numbers of participants now watch feeders from their homes. For some species, feeder watchers saw seven times more birds per feeder than the field parties.

Thus, for some species, an increase in numbers, as documented by CBC data, could really be just an increase in feeder-watching effort. Dunn urges those who compile CBC data to take feeder effort into account when collecting and analyzing the data.

COMPILED BY CYNTHIA BERGER

Spotlight

TOP GUN

by David Wilcove

Perched at the top of the food chain, the Harpy Eagle may be the key to a healthy ecosystem

If confession is good for the soul, this essay will make me a better man. In previous columns I have extolled the virtues of a host of obscure but rare birds, maintaining that in drabness there is sufficient excitement and diversity to captivate any thoughtful bird watcher.

So what has been at the top of my own "most wanted" list? Ashy Ant-wren? Plain-flanked Rail? Hardly. When I close my eyes and imagine myself hiking through a tropical forest, binoculars clutched in my sweaty hands, the bird that sweeps into view is none other than the Harpy Eagle, the world's largest and most powerful raptor. So much for little brown birds.

I'm not alone in this regard. Something about raptors excites and inspires people. It is hardly coincidental that the national bird of the United States is an eagle and not a warbler, or that the ancient Olmec of Central America revered the harpy while ignoring the far more numerous flycatchers around them.

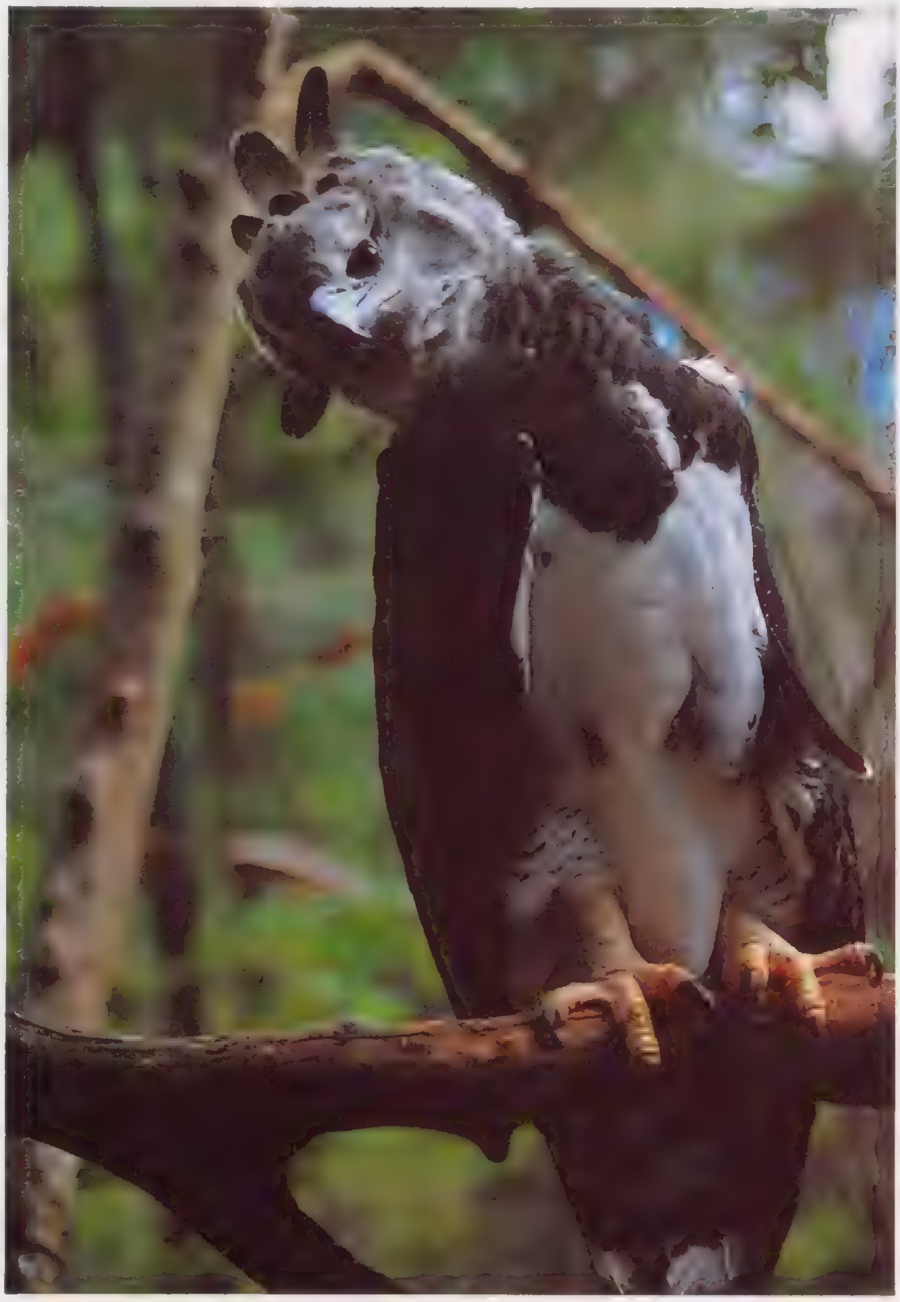
Aesthetic and spiritual considerations aside, conservationists have good reasons for paying attention to large predators such as the Harpy Eagle. A growing body of evidence suggests that they play key roles in the functioning of natural ecosystems. Yet such birds are especially vulnerable to extinction.

Just how vulnerable was revealed several years ago in a remarkable study by French ornithologist J. M. Thiollay. Working in the sparsely populated nation of French Guiana, he censused breeding raptors in a 25,000-acre plot of pristine rainforest. To gain some appreciation of the magnitude of this work, imagine a 40-square-mile area, devoid of roads and settlements and cloaked in virgin forest; now imagine trying to find every breeding pair of vultures, hawks, eagles, and falcons in that space.

Thiollay worked on this grand scale because most tropical raptors occur in such low densities that only a very large plot will have more than a pair or two of each species. But even on his 25,000-acre plot, Thiollay did not record all 27 of the forest raptor species found in French Guiana; he found only 23. Perhaps more alarming, only two of those 23 species (Red-throated Caracara and Lined Forest-Falcon) had more than 10 breeding pairs on the plot. Eighteen species had fewer than five pairs. Consider, then, the consequences of establishing a 25,000- or even a 250,000-acre park in the Amazon Basin. Most raptors will not be represented by enough pairs to constitute a viable population.

For the Harpy Eagle, the numbers are especially grim. Thiollay did not find any in his huge study plot. He attributes its rarity to three factors. First, harpies are patchily distributed in French Guiana; second, individual birds have immense home ranges covering thousands of acres; and finally, the Harpy Eagle rarely occurs in areas occupied by its smaller relative, the Crested Eagle.

In addition to its rarity, two other attributes of the harpy make it vulnerable to extinction. Generally regarded as a denizen of pristine rainforests, the species cannot survive in highly degraded patches; and it has a very low reproduction rate. Harpies



ERWIN AND PEGGY BAUER (2)

The Harpy Eagle requires an enormous home range—more land than most existing parks and preserves contain.

probably do not breed until they are several years old; they typically fledge only one young per nesting cycle; and the period of parental care may last for eight months.

As for the harpy's role in tropical ecosystems, a growing body of circumstantial evidence suggests that top predators like the Harpy Eagle hold the key to ecosystem stability. Consider the case of Barro Colorado Island in central Panama. Once a forested hilltop, it became an island in the beginning of this century when the Chagres River was dammed to form the central section of the Panama Canal.

Jaguars, pumas, and harpies all disappeared from the site in the ensuing years, presumably because the island was too small to support viable populations. More surprising is the fact that more than 45 other species of birds also vanished from Barro Colorado over the past five decades, including a number of species that nest on or near the ground.

Some of these other birds were once reasonably common on the island, suggesting they could have maintained healthy populations had not something else done them in. That "something else" may be the remarkably large populations of coatimundis, armadillos, and opossums that now inhabit Barro Colorado. All are species that happily consume the eggs and nestlings of birds. Research has shown that nest predation rates are much higher on the island than on the mainland. Biologists speculate that populations of nest-raiding mammals have exploded on Barro Colorado because their chief predators—including the Harpy Eagle—are gone. The nest raiders, in turn, have eliminated the ground-nesting birds.

The recipe for finding a Harpy Eagle has always been simple: Spend as much time as you possibly can in the wildest tropical forests you can find between Mexico and Brazil. And hope you're lucky. An experienced naturalist can spend years in the field and never encounter the bird; a tyro can stumble across one on his first trip to the rainforest.

The harpy helps other birds by preying on nest-raiding mammals.

Not being the lucky sort, I had more or less reconciled myself to never seeing a Harpy Eagle when I learned of an area in southern Venezuela where the residents had located several harpy nests and were supplementing their incomes by showing the birds to salivating bird watchers. I had to go there.

From Caracas I flew to Puerto Ordaz, then drove several hours to the little town of Campamento Rio Grande and the immense Imataca Forest Reserve. The next afternoon, a quiet logger named Nieves guided me through several miles of muddy trails to an immense tree in a clearing. A hundred feet up, where a large branch split off from the trunk, was a nest of sticks, and next to the nest was one very wet and very intimidating Harpy Eagle. It was a youngster—about seven months old according to Nieves—but quite capable of flight. Although its parents no longer fed it at the nest, it returned there each night to roost.

Only after staring at the eaglet for a half-hour or so did I begin to pay attention to its surroundings. To my surprise, I was in nothing close to a pristine forest. For miles around, most of the largest, choicest trees had been removed by the loggers, leaving a relatively intact but unimpressive forest. Yet somehow the harpies were not only surviving, but apparently prospering. Nieves claimed to know of two other pairs nesting within a dozen miles of the nest we were watching.

Perhaps we have underestimated the ability of Harpy Eagles to tolerate moderate amounts of habitat alteration. Perhaps the vegetation changes caused by selective logging are boosting populations of eagle prey such as sloths. Or perhaps it's all a fluke—disgruntled tour groups report that the harpies are not nesting in the area this year.

The young eagle stretched its wings and turned. As it faced away from me, I could see a radio transmitter strapped to its back, the long, thin antenna extending beyond its tail. "My" harpy was apparently the subject of an ongoing study, and somewhere in the vicinity, a biologist with a receiver was tracking its movements. I won't pretend that I wasn't a little disappointed to see the transmitter on the eagle's back—it made me feel as though I were watching a bird in a zoo. But my own disappointment was a small price to pay for information that could help save such a magnificent animal. ■

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My Turn

PAYING OUR FAIR SHARE

by Paul Kerlinger

Birders should back the Wildlife Diversity Funding Initiative

A new bill headed for Congress deserves the support of the 76 million Americans—including birders—who observe, feed, and photograph wildlife. The legislation, tentatively named the Wildlife Diversity Funding Initiative, would provide a stable funding base for state wildlife programs other than the ones that focus on game and endangered species. Birds such as the Wood Thrush and Prairie Warbler, which have declined in numbers but are not yet considered threatened, will benefit from this legislation.

Currently, state wildlife programs are funded through such measures as voluntary tax check-offs, wildlife license plates, and a surcharge on hunting and fishing paraphernalia. Although these mechanisms have launched many wildlife conservation programs, they fall short of providing the funds needed to ensure a safe future for birds and other animals that aren't hunted. Many states spend tens of millions annually on game species yet have yearly budgets of less than $1 million for their entire non-game and non-endangered species programs.

The proposed Wildlife Diversity Funding Initiative would provide about $350 million per year in dedicated conservation support through modest surcharges on the purchase price of outdoor products such as binoculars. The International Association of Fish and Wildlife Agencies (IAFWA), which is spearheading the drive to pass the initiative, says that a large portion of the revenue will be used to acquire and conserve habitat. The revenue will also support research, species recovery programs, habitat restoration and management projects, and public education. Most importantly, funds will be dedicated to these purposes, meaning that by law they cannot be diverted for any other use.

The initiative calls for surcharges of up to 5 percent on the wholesale price of such outdoor gear as optics, field guides, hiking boots, tents, sleeping bags, film, cameras, birdseed, bird feeders, and recreational vehicles. For example, the surcharge would be $12 on a $500 pair of binoculars or five cents on a $2 bag of birdseed. It's a small amount, but with Americans spending more than $18 billion per year on wildlife-related recreation, it translates to hundreds of millions of dollars per year.

Programs similar to this new initiative have been enormously successful in funding wildlife programs in the past. Look at how they have benefited the conservation of game animals. The Pittman-Robertson Federal Aid in Wildlife Restoration Act of 1938 levied a user fee on hunting paraphernalia, the first such tax enacted in the United States. The rationale was that hunters should fund the programs needed to protect the wildlife they loved. The Pittman-Robertson Act united hunters and gave them an identity as conservationists. The Wood Duck is one example of a game bird that has rebounded from near-extinction thanks to the protection provided through adequate funding.

Today, the Pittman-Robertson Act, together with user fees on fishing paraphernalia, provides $350 million per year from the 40 million Americans who hunt and fish. The federal government collects these funds and apportions them to state wildlife agencies. The Wildlife Diversity Funding Initiative would be administered in the same way.

> *Banding together to support this initiative will give us more political clout than we have ever had*

Some birders have expressed concern about how the new revenues will be used. The birding community will certainly benefit; not only will the funds help to conserve the birds we want to see, but they will provide better access to wildlife habitat, including better trails, parking, and other services at state forests, parks, and wildlife areas. At last the services we birders want will be provided—because *we* will be supporting them.

Other birders have objected to user fees on the grounds that whereas hunters consume wildlife, birders do not. Birding is not without its negative impacts, however. Those parking areas, trails, access roads, wildlife viewing sites, visitor centers, and rest rooms that make our field trips more pleasant all use wildlife habitat, and our comings and goings disturb some birds. The Wildlife Diversity Funding Initiative would provide funds to mitigate our impacts.

Some businesses also oppose the initiative. Back in the early 1980s many businesses formed a lobby to oppose a similar user fee, and it was never enacted. Business leaders believed that user fees would cost them sales by raising the price of products; they didn't realize that wildlife-associated recreation such as birding was a rapidly growing business and that user fees would eventually benefit their businesses by insuring the future of wildlife.

The current Wildlife Diversity Funding Initiative has the support not only of the IAFWA but of major national conservation organizations, including the National Audubon Society, American Birding Association, National Wildlife Federation, World Wildlife Fund, Defenders of Wildlife, and others. It is imperative that we birders make our feelings about this initiative known—or we may lose the most important wildlife conservation opportunity to come along in decades.

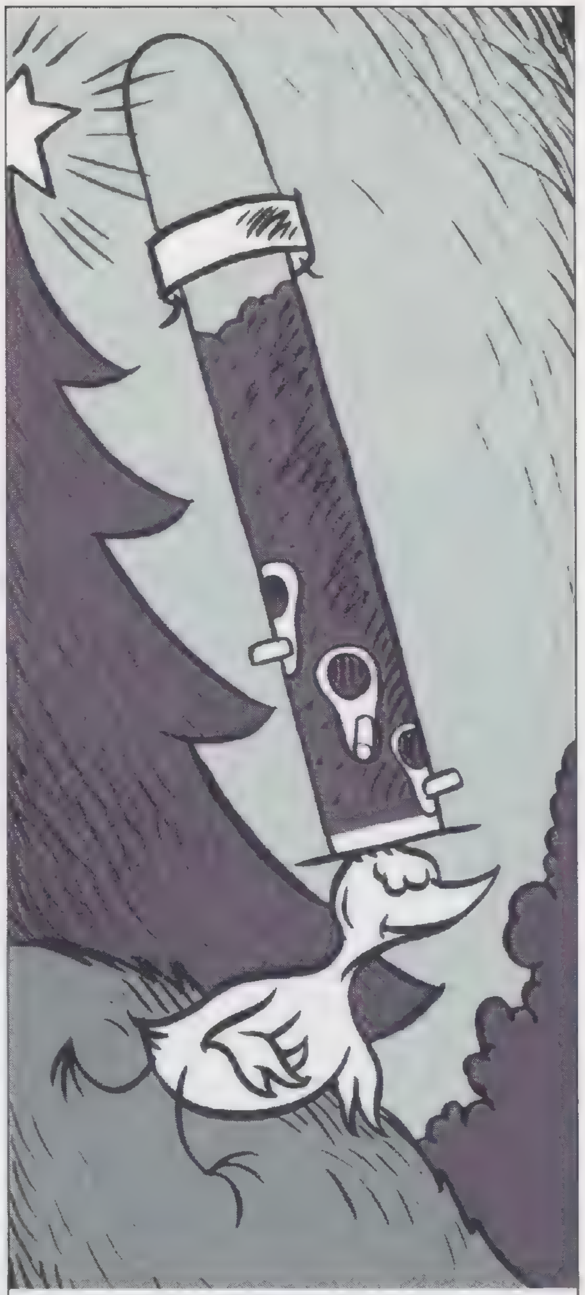
We as birders finally have the chance to be heard by the people who run our wildlife programs. Banding together to support this initiative will give us more political clout than we have ever had. The initiative will also give us a chance to unite with other wildlife users to form an even larger conservation coalition.

If you want to see our state wildlife programs flourish, write to your congressmen and senators. Tell them that you are in favor of the Wildlife Diversity Funding Initiative. When you buy outdoor products, write to the manufacturers to let them know that their income comes from people who watch wildlife—and therefore depends on the health of our wildlife.

Now that birders finally have a chance to be heard, let's make sure the initiative is enacted. If we do not support the Wildlife Diversity Funding Initiative now, we may not get the chance again. ■

Paul Kerlinger, former director of the New Jersey Audubon Society's Cape May Bird Observatory, is a consultant specializing in environmental and ecotourism issues and the author of a new book, How Birds Migrate.

For a free kit describing the Wildlife Diversity Funding Initiative and providing the addresses of fish and wildlife agencies you can contact to help, write to Naomi Edelson, Wildlife Diversity Coordinator, International Association of Fish and Wildlife Agencies, 444 N. Capitol St. NW, Suite 534, Washington, DC 20001. Phone (202) 624-7890.



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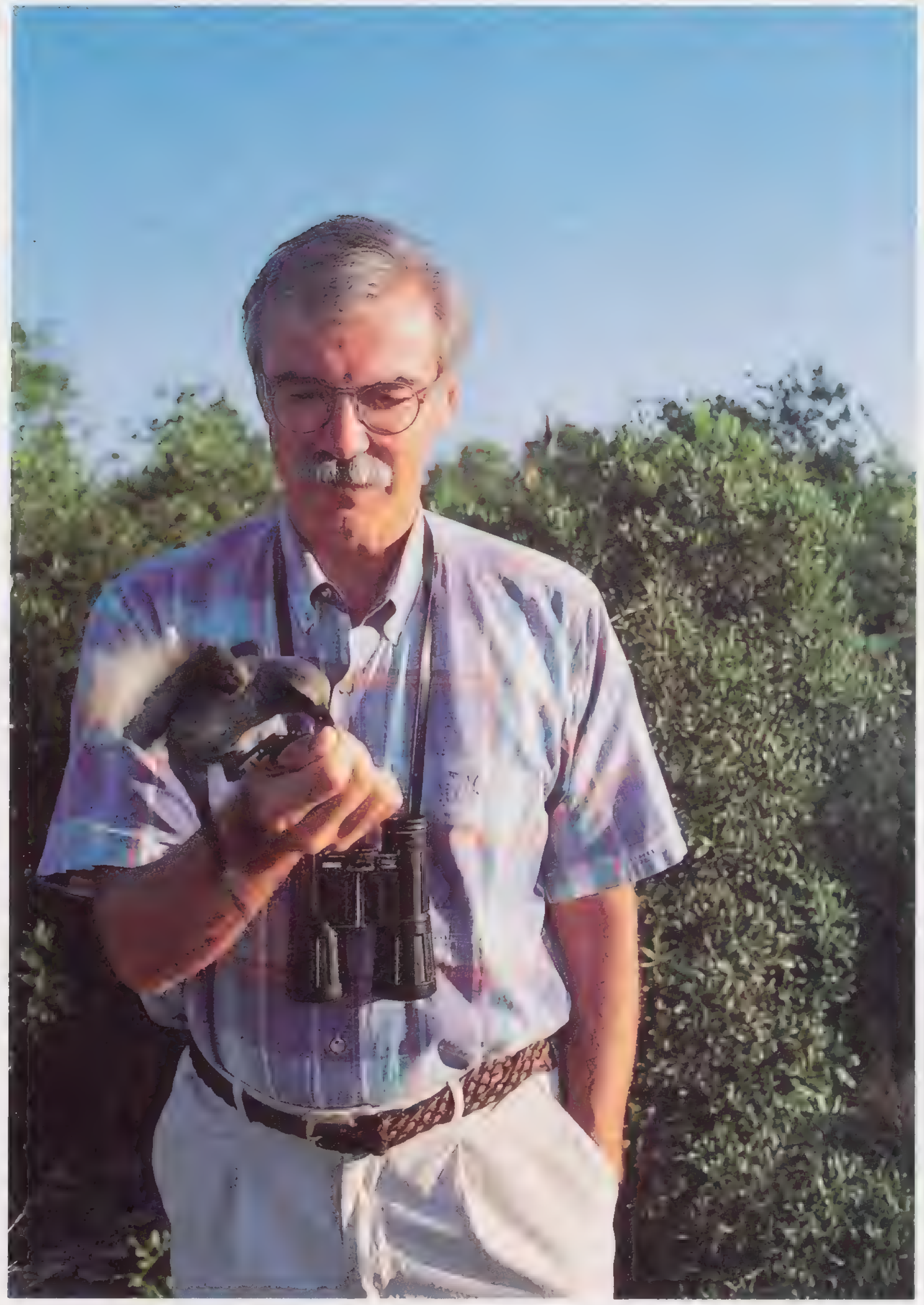
HE'S ALSO A BIRD WATCHER

BY DON STAP



CAMERON DAVIDSON

Meet John Fitzpatrick—scientist, conservationist, and the Lab's new director

"Why does Cornell have a Laboratory of Ornithology?" John Fitzpatrick asked. "Why not a Laboratory of Segmented Worms?" An odd question, one might think, particularly since Fitzpatrick, a highly regarded ornithologist, had recently been appointed director of the renowned Cornell Lab. I was sitting in Fitzpatrick's office at Archbold Biological Station in Lake Placid, Florida, where I had come to talk with him about his decision to leave Archbold. Over the years, I had grown accustomed to Fitzpatrick's penchant for asking fundamental questions, and, as usual, he had an answer: "Because birds are great communicators of natural processes—they are windows into nature."

John Fitzpatrick peered through one of those windows as a child and never stopped looking. "In kindergarten I was already watching birds and drawing them," he told me, "and I remember the day I was home sick and saw my first American Redstart." Fitzpatrick also reminisced about attending his first Christmas Bird Count when he was six—"I didn't miss a one for the next thirty years"—and he remembered, with great affection, one of his neighbors in the rural suburbs of Minneapolis-St. Paul, the talented bird artist Francis Lee Jaques, who enjoyed entertaining the young Fitzpatrick with his collection of model trains.

When I first met John Fitzpatrick in the summer of 1984 at the Field Museum of Natural History in Chicago (where he was head of the Division of Birds), he had not yet entered the labyrinth of conservation biology (nor did he yet have a gray hair on his head). I asked him that day not so much about his own research as that of Louisiana State University ornithologists John O'Neill and Ted Parker, who were to be the principal subjects of a book I was working on. Fitzpatrick, with a generosity I would see more of in subsequent conversations, spoke enthusiastically about O'Neill and Parker, virtually ignoring his own important work—work that has earned him an international reputation.

During the 1970s and '80s Fitzpatrick was one of the driving forces in a renaissance of ornithological exploration and discovery in the neotropics. From 1974 to 1987 he tromped through the tropical forests of Peru, Venezuela, Brazil, Colombia, and Ecuador, and was one of a handful of ornithologists who discovered—in some of the remotest areas on earth—birds that were previously unknown to science. Altogether, Fitzpatrick authored or co-authored the description of six new species and a seventh yet to be named. In addition, Fitzpatrick has presented papers at conferences in Moscow, Berlin, Rio de Janeiro, and elsewhere around the world, has published two books and more than 50 articles, and has given talks at universities across the United States, much of this based on his field work in South America.

The road from bird watcher to ornithologist opened up for him in college. "It was after I got to Harvard that I realized people made a living studying birds," Fitzpatrick told me. "One day, just wandering the halls in the Museum of Comparative Zoology, I knocked on the door of Ernst Mayr—I'd never heard of him—and I began talking about bird watching." Fitzpatrick, unaware of Mayr's worldwide fame for his work in evolution theory, rambled on excitedly about birding adventures. "When I paused," Fitzpatrick related, "Mayr said, 'Oh yes, I'm *also* a bird *watcher*.'"

In his senior year at Harvard, Fitzpatrick was accepted into graduate school at the University of California in Berkeley. Later in the year, however, Princeton biologist John Terborgh (noted, among other things, for his work on tropical ecology at Manu National Park in Peru) presented a lecture at Harvard. Fitzpatrick went up to the podium after the lecture and found himself in a stimulating conversation with Terborgh. Before they parted company, Terborgh sensed Fitzpatrick's promise as an ornithologist. "Come with me to South America," Terborgh said to him. Fitzpatrick quickly applied to Princeton and that summer, before classes had even begun, headed for South America.

In Fitzpatrick's second summer of research, in a cloud forest in extreme northern Peru, he and fellow researcher David Willard set up camp and began putting up mist nets to collect birds. "The next morning," Fitzpatrick recalled, "the first bird we took out of the nets was a wren. Dave and I looked at each other and said, 'What is this? It's a wren but it has wingbars. Wrens don't have wingbars.'" A few days later, they collected a second bird they could not identify, a hummingbird. Both birds turned out to be new to science.

JOE McDONALD

A dedicated conservationist, John Fitzpatrick has spent more than 25 years studying the behavior and habitat requirements of the threatened Florida Scrub Jay, above.

Though dramatic, these discoveries were only one part of a 10-year project in which Fitzpatrick documented the importance of low mountaintops in the neotropics as "islands" of evolutionary change. In addition, on the way to his Ph.D. at Princeton he published a major monograph on neotropical flycatchers, the largest and

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most diverse family of birds in the world.

This wasn't quite enough for Fitzpatrick, though. At the same time, his research was taking him to Archbold Biological Station in central Florida each year to study Scrub Jays with Glen Woolfenden, an ornithologist (and Cornell alumnus) on the faculty at the University of South Florida in Tampa. Fitzpatrick first visited Archbold in 1972, at the end of his sophomore year at Harvard. On a National Science Foundation internship, he spent the summer helping Woolfenden study dominance behavior in Scrub Jay families.

Several years earlier, Woolfenden had noticed something unusual about the birds. Young jays remained with their parents to help guard their territory and even assisted in raising successive generations of fledglings. This unusual behavior drew Woolfenden and Fitzpatrick into a detailed study of the jays—25 years and counting—on a 1,000-acre site directly behind Archbold's headquarters.

When I visited Fitzpatrick at Archbold in 1988, not long after he had settled into his position there as executive director, he took me into the home of the Scrub Jays—the unique ecosystem known as Florida scrub. This miniature forest of shoulder-high oaks and hickories exists only on a few sandy ridges in Florida. Standing in a firelane, Fitzpatrick pursed his lips, spoke a few syllables in the universal language of curious birds—"*splish splish splish*"—and within seconds several jays zoomed in over the treetops and boldly lit on Fitzpatrick as if he were nothing more than a park statue.

Fitzpatrick has worked hard to protect rare Florida scrub habitat. Thousands of acres have been bulldozed to make way for citrus orchards, right.

CAMERON DAVIDSON

Fitzpatrick read one of the bird's leg bands. "This is dash-silver-azure-yellow," Fitzpatrick said. "He's the oldest living jay in this study site, fourteen years old. Over there is one of his daughters, and that's his mate." Fitzpatrick can trace a jay's ancestry back more than 20 years, and provide the highlights: deaths in the family, how long a marriage has lasted, power struggles, and other tidbits of the sort one would hear at a family reunion.

Today, the Florida Scrub Jay's complex social system is well documented (Woolfenden and Fitzpatrick's book on the subject won the prestigious William Brewster Award from the American Ornithologists' Union). Moreover, Fitzpatrick and Woolfenden have illuminated the relationship between the Florida Scrub Jay's unique habitat and the bird's unusual "cooperative-breeding" behavior. In recent geologic history, scrub has existed only in isolated pockets within pine forests. Consequently, once a tract of scrub is filled to capacity (one family per 20 acres) young Scrub Jays who want to start a family have nowhere to go—their evolutionary adaptations restrict them to scrub. Therefore, young Scrub Jays remain with the family, waiting their turn to inherit the territory when the patriarch dies or replacing a lost breeder next door without having to leave home.

As Fitzpatrick returned to Archbold every year, he began to notice that more and more scrub was being bulldozed to make way for citrus groves or retirement communities. At the same time, biologists were discovering that an amazing percentage of scrub flora—40 percent—was found nowhere else in the world. By 1988 Fitzpatrick's work in South America was winding down, he was married, had a young daughter and another child on the way, and Archbold was offering him, for the second time, the position of executive director of the station. With the prospective demise of Florida scrub nagging him, he accepted.

"Here was a chance," Fitzpatrick told me, "to make a real difference in a place that meant a great deal to me—an opportunity to put some of the conservation biology I'd been writing about into action. And I thought, 'If we can't do it here, in the States, we're fooling ourselves about doing it in the rainforests.'"

In 1987 fewer than 10,000 acres of pristine scrub (and related xeric habitat) remained along the major ridge of scrub in central Florida; an estimated 60,000 acres existed at the turn of the century. In his first days at Archbold, Fitzpatrick watched helplessly as a major citrus grower bulldozed and burned 1,600 acres of prime scrub only a few miles from the biological station. Fitzpatrick went out and shot video footage of the Scrub Jays, who perched on what remained of their home—the bulldozed piles of trees. Then he got to work. He called county commissioners, formed a strong alliance with the Florida chapter of The Nature Conservancy, and saw to it that newspapers around the state ran articles about the plight of the scrub.

During the next few years, on several visits to Archbold, I watched Fitzpatrick give personal tours of scrub to prospective Nature Conservancy patrons; produce a broadcast-quality video on the endangered ecosystem; argue about property values with state officials; discuss research with visiting scientists; and, in the middle of one hectic day, as he bounded up the stairs to his office two steps at a time, cup of coffee in hand, stop in his tracks, turn, and hustle outside to say hello to his daughter's kindergarten class, which was on a field trip to the station.

"When I took this job," Fitzpatrick told me one day, "I made a rough assessment that my duties here wouldn't be more than my duties at the Field Museum. I was *wrong*," he said, laughing. "I wrote more about Scrub Jays when I was in Chicago!"

Nevertheless, Fitzpatrick was well-suited to spearhead the campaign to save Florida scrub. David Wesley, a field supervisor with the U. S. Fish and Wildlife Service, admires Fitzpatrick's ability to present a subject clearly and forcefully: "John is that rare combination—a highly qualified scientist who is also capable of talking in layman's terms. He's a great communicator." Highlands County, where most of the remaining scrub exists, is, in Fitzpatrick's words, "the epicenter of endangered species." When asked why bother saving the scrub, Fitzpatrick will reply, "Why save the Mona Lisa—it's old and doesn't do anything for us." If someone suggests that conservationists always want to save everything, Fitzpatrick will point out that "we only want to save what's left of the scrub, the crumbs of the pie, so we can smell them and imagine what the whole pie must have been like."

Now, as Fitzpatrick leaves his position at Archbold, the situation is still critical, but the movement to save the scrub has a life of its own. In 1992 the U.S. Fish and Wildlife Service approved the Lake Wales Ridge National Wildlife Refuge, which—in combination with a massive effort by the State of Florida—will set aside approximately 20,000 acres of scrub. Archbold and The Nature Conservancy have added important tracts of scrub to their holdings. Still, Fitzpatrick was reluctant to leave Archbold. "I dearly love this place," he said, "probably more than anyone could understand."

Why move to Cornell then? "Well, it is Cornell, after all," Fitzpatrick said. "The Lab of Ornithology is the preeminent institute for bird conservation and education."

Fitzpatrick's eyes brightened with enthusiasm as he told me about the Lab's network of bird watchers who contribute data to several ongoing research projects. "The Lab has found a new way to use bird watchers' observations. By asking them specific questions, amateur bird watchers are educated in the principles of the scientific method, and their observations educate us."

"STUDYING BIRDS LEADS PEOPLE TO CHANGE THEIR VIEW OF THE WORLD"

The Nest Record Program, begun in 1965, asked participants to record information on nesting birds, which in turn provided the Lab with a wealth of material on the breeding biology and nesting success of more than 600 species throughout the United States. Project FeederWatch, with more than 12,000 participants, surveys birds that visit backyard feeders during the winter, providing data that help establish the abundance and distribution of species, as well as track population trends. Project PigeonWatch has educated young urban kids in the pleasures of bird watching and the science of studying birds. More recently, Project Tanager has enlisted volunteers to look for tanager nests in forests of all sizes, including those surrounded by farmland or other unsuitable tanager habitat.

"In fifty years, I hope the Lab will be recognized for having galvanized the energy of interested amateurs," Fitzpatrick said. "Studying birds leads people to change their view of the world. It's very exciting for me to be able to participate in this. This is what I want to do with my life."

A consummate professional, Fitzpatrick still exudes a child's excitement and sense of wonder when he looks through one of those windows into the natural world. As he thinks of more ways to bring together professionals and amateurs, he must hear the echo of words spoken nearly 25 years ago—"I'm *also* a bird *watcher.*" ■

Don Stap, the author of A Parrot Without a Name, *has written articles for* Smithsonian, Audubon, Orion, *and other magazines. He teaches creative writing at the University of Central Florida.*

DISCOVERING BOSQUE DEL APACHE

MARIE READ

BY CYNTHIA BERGER

The Festival of the Cranes, November 1994: The sun is on the horizon as I walk slowly along the dike at Bosque del Apache National Wildlife Refuge in southern New Mexico. The leaves of the cottonwoods along the dirt road are pure gold in the autumn light, and the pale full moon is just clearing the top branches of the tallest tree. After a day of high winds the air is calm; I can hear coyotes yelping in the distance, the faint continuous rustle of the cottonwood leaves, and a sound like a strangled trumpet blast: *gar-ooo-oo, gar-ooo.* Then the birds appear overhead, so close that some of the people in our group reach up involuntarily, as if to touch them. They are Sandhill Cranes.

A HUMAN-ENGINEERED WETLAND THAT WORKS

The birds materialize over the wall of cottonwoods that separates the dike from the meadow beyond. They fly slowly, in little family groups of three or four; just a few at first, then more and more until the sky is full of cranes and the luminescent wisps of shell-pink cloud. We stand transfixed as the moon continues its steady creep heavenward and the

At sunrise, Sandhill Cranes at New Mexico's picturesque Bosque del Apache National Wildlife Refuge preen and prepare to leave their marshy roost for feeding grounds nearby.

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cranes pass before it, necks outstretched purposefully, wings tracing deliberate arcs, long legs trailing behind like an afterthought.

The delight I feel at this primeval scene is destined to be dampened, though. After the sky has grown dark, after the cranes have vanished into the marshes where they will roost for the night, safe from hungry coyotes, and we're bouncing back to the visitor center on the overheated bus, I hear our guide tell his seat mate, "We always take the tour groups here. We scouted it out. It's the best location, because the cranes fly right over you, real low."

My impression of a serendipitous encounter in archetypal wilderness is completely squelched the next day when refuge manager Phil Norton, talking to an audience of crane festival visitors, tells us frankly that the entire refuge is a human creation. "Actually," he confides, "it's sort of an enormous farm. This is probably the most intensively managed of all 500 National Wildlife Refuges."

Norton, a tanned, compact man who wears wire-rimmed glasses and speaks with a Southern drawl, first visited Bosque del Apache nine years ago, then lobbied his superiors in the U.S. Fish and Wildlife Service to assign him here. "Things had been kind of downhill at Bosque ever since World War II," he says; in particular, the elaborate water control system built by the Civilian Conservation Corps between 1939 and 1942 had fallen into disrepair. But Norton had a vision of what the refuge could become.

Today, thanks to the energetic work of refuge staff and the largest cadre of resident volunteers in the National Wildlife Refuge system, the water system is working, a new management plan is in place, and Bosque del Apache is a happy paradox—a place where massive alteration of the landscape by humans has, for once, worked wonders for wildlife. As I learn more about the refuge, the disappointment I feel at learning that it's not a pristine natural habitat is washed away by my feeling of admiration for how well this intensive management works.

Bosque del Apache was established in 1939 as part of President Franklin Roosevelt's plan to develop a national system of wildlife refuges. It was not a place where huge numbers of cranes had wintered since time immemorial; instead, it was created to attract and protect Greater Sandhill Cranes, a subspecies that was, at the time, endangered. Only 17 cranes wintered at the refuge in 1941, but since then the birds have made a spectacular recovery—more than 14,000 Greater Sandhills, and also some Lesser and Canadian Sandhill Cranes, now find a winter home at Bosque.

A CELEBRATION OF CRANES

Each year in late November, after the migrating Sandhill Cranes have arrived at Bosque del Apache, thousands of birders from across the nation converge on the refuge to celebrate the **Festival of the Cranes**. A major event since 1989, the festival offers four exciting days of bird watching, exhibits, and special activities.

This year, the festival runs from November 16 to 19. Events include special guided tours in areas of the refuge usually off-limits to the public, to see massive flocks of Sandhill Cranes and Snow Geese take off from their roosting grounds in the morning or settle in at night. On Saturday and Sunday, tents adjacent to the visitor center will house exhibits that include live raptors and other New Mexico wildlife. You can have your picture taken with the festival's mascot, eight-foot-tall "Sandy the Sandhill Crane," take your children to the Kid's Corner for hands-on activities, or snack on southwestern specialties at the food booths.

Other festival events take place in the nearby town of Socorro, 18 miles north of the refuge on Route 25. Enjoy the crafts and fine arts show or follow the giant crane footprints painted on Socorro roadways to the campus of the New Mexico Institue of Mining and Technology, where workshops are offered on Thursday and Friday. You can sharpen your bird identification skills, brush up on your bird photography, or attend programs on the cultural and natural history of the area. Keynote speakers for the evening programs include two noted author/photographers, Karen Hollingsworth and Arthur Morris, and international bird tour leader Victor Emmanuel. A bluegrass concert kicks off the festival on Wednesday night.

Accomodations are limited near the refuge, but Socorro has many motels and restaurants to choose from. The nearest airport is in Albuquerque, a little more than an hour's drive to the north.

The Festival of the Cranes is sponsored by the Bosque del Apache National Wildlife Refuge, the City of Socorro, and the Socorro Chamber of Commerce in cooperation with the U.S. Bureau of Land Manangement. For a festival program and registration information, write to the Festival of the Cranes, P.O. Box 743-LB, Socorro, New Mexico 87801, or call the Socorro Chamber of Commerce at (505) 835-0424.

CYNTHIA BERGER

Sandy the Sandhill Crane greets visitors at New Mexico's annual Festival of the Cranes.

MARIE READ

Bosque del Apache is the winter destination for thousands of migrating Greater Sandhill Cranes like the one above. A green oasis in the midst of desert uplands, the refuge also attracts migrating waterfowl, shorebirds, and songbirds.

Other birds have benefited, too, including some 50,000 ducks that winter on the refuge, as well as shorebirds, Rio Grande Wild Turkeys, Bald and Golden Eagles, and the endangered Southwestern Willow Flycatcher. A mere handful of Snow Geese visited the refuge in its early years; now, they outnumber the cranes, with as many as 50,000 of the small white geese forming a living blizzard when they fly above the refuge each winter day at sunrise and sunset.

The refuge works because the management plan reverses earlier human impacts, creating habitat that has been lost elsewhere in the river valley. The word "bosque" is Spanish for "woods," describing the cottonwood trees and willows that blanketed the banks of the Rio Grande before Europeans settled here.

On another day of my visit to the refuge, I leave my rented car to explore a remnant of this ancestral bosque. A sand path, decorated with deer tracks and twisted lumps of coyote scat, wends beneath the big trees. The loud clatter of the dry leaves is exhausting. I cross an alkali flat, where deadly nightshade hangs out yellow globes of poisonous fruit. Here the soil is crusted with salt and imprinted with the calligraphic traces of lizard tails. A Northern Flicker explodes from the underbrush almost under my nose and pumps away, flashing red under its wings.

This riverside forest has always been a haven for migrating birds, a hospitable green pathway skirting the Chihuahuan Desert. Birds followed the corridor as they moved from summer breeding grounds in Idaho, Montana, and Wyoming to wintering grounds in the south. Paradoxically, the bosque relied on annual disruption to maintain its complexity and productivity. Each spring the river flooded, scouring and soaking the plains to create the ideal conditions for cottonwood and willow seeds to sprout—these trees are adapted to growing in wet soil. The flooding also flushed out harmful salts.

The first European settlers did little to change the bosque, although in the face of Spanish exploration and colonization the native peoples, called the Piro, started leaving at the end of the 16th century. In 1821 the land became part of Mexico when it declared independence from Spain; then in 1840 New Mexico became a territory of the United States, and the bosque with it. Early in the 20th century westerners started damming the river's tributaries to con-

MARIE READ

trol the floods and diverting water for vast irrigation projects. Today the Rio Grande is contained between levees all the way from Albuquerque to Socorro. In most places the rejuvenating spring flood waters just can't reach what remains of the bosque.

Except at Bosque del Apache, where reconstruction of the extensive system of dikes, drains, and canals has been painstakingly accomplished. This system moves water out of the Rio Grande and all around the refuge, alternately draining and flooding the 1,500 acres of marsh at the heart of the 57,000-acre refuge in a cycle that imitates nature—and grows lots of bird food.

On another day, as I drive around the refuge loop road, I spot a small flock of dowitchers at the edge of one of the drainage ditches, their long bills probing the mud in a steady rhythm like a roomful of sewing machines. Beyond the ditch, the wind whips feathers and chaff across a churned-up,

The cranes' natural diet is supplemented with corn, which local farmers grow on refuge land, at left. Below, a wary crane peers over the cornstalks, keeping a lookout for hungry coyotes.

MARK J. BILAK

C. ALLAN MORGAN (2)

Snow Geese feed on water plants in a Bosque marsh, above right. Flooding and draining the area encourages a natural succession of foods that different species eat in turn. Above, three cranes tussle over turf.

bare-mud field where several hundred cranes have gathered. I can hear their calls, a sort of cooing trill, before I even open the car door. An American Kestrel perched on the wire overhead watches me over his shoulder. Some of the cranes are poking their long bills at one another, their necks flattened aggressively, tail feathers shaking in the breeze. But most birds are head down, rooting in the mud for chufa, a kind of sedge that has a nutlet on its roots that cranes love.

The refuge marshes are on a seven-year cycle, according to Norton. "We 'moist-soil' it here," he says, meaning that the soil moisture is manipulated to encourage the desirable seeds to germinate. "Millet is one of the plants that grows up first—the ducks like it," he says. "As the cycle goes on, other plants grow up, and other wildlife responds to it—the Snow Geese eat three-square bulrush; the cranes probe for chufa nuts. We just keep flooding areas and moving birds around. At the end of the cycle, the marsh has grown up to cattail and bulrush—not very productive. So we'll let an area go dry, burn the cattails, and disk the ground. Then we flood the land in March, drain it in April, and let the seeds germinate. We don't have to plant anything—the seed bank is there."

Farther up the road, I'm surprised to see a field of dry corn. I check my map; yes, this farm field is an official part of the refuge. The tops of the stalks have been bent over and the tassles drag on the ground. Snow Geese trundle through the rows, gabbling quietly. On the bank that separates one field from the next, a coyote sits in the sun, its ears erect, tawny coat a perfect match for the yellowing cornstalks.

The refuge includes farmland because there's not enough natural food in this valley to support the high populations of geese and cranes, according to Norton. "When the weather turns colder, the birds need more food," he says. Two local farmers grow corn and also alfalfa on a total of 1,100 acres of refuge land. They harvest the alfalfa for their own use and leave the corn for the geese and cranes.

"We favor cranes over geese," says Norton. "We try to keep most of the cranes on the refuge; otherwise they can be a nuisance on local farms. They especially love red chili peppers. But we don't want too many geese here because they can spread avian cholera if they're concentrated in one place."

The coyotes are a natural part of the goose-management plan. They provide a useful service for the refuge by preying on geese that are weakened by disease. Norton also encourages geese to move along to other New Mexico refuges by 'bumping' the corn. "Instead of mowing it to the ground, we just knock it over a little," he says. "It's still kind of high, so the geese don't like to go in it, because they can't see predators coming. But the cranes are taller and can see over the bumped corn, so they feed there readily."

By now, I'm hungry too, so I leave the refuge to get some lunch at the Owl Bar and Cafe, a restaurant in nearby San Antonio that's justly famous for its green-chili cheeseburgers. Working men wearing caps emblazoned with seed-company logos pack the booths; on the jukebox, Tim McGraw is crooning "Down on the Farm." As I drive back onto the refuge, a tractor lumbers along toward the cornfields.

At the opposite end of the refuge is a place that looks more like the surface of the moon than a productive marsh or farm field—acres of bare brown earth and heaved-up piles of twisted tree roots. Here Norton and his staff are testing ways to control tamarisk, also known as salt cedar. This plant was introduced throughout the West to control soil erosion but has spread wildly, displacing native species.

"Our main tool for eradicating salt cedar is mechanical clearing," says Norton. "We plow the salt cedar up, stack it up, let it dry, and burn it. Then we cut the roots with a plow and rake up the stumps. Once the land is cleared, we drill holes, take a limb from a dormant cottonwood, and place it in the hole so it reaches the water table. Eventually a new tree starts to grow." This technique works, but it's expensive and labor intensive. "We're also experimenting with ways to get more natural revegetation," says Norton. "We hope the control techniques we develop can be used in other sites."

On my last day at the refuge, I return to the farm field where the birds have been feeding. Snow Geese blanket the ground; farther off the cranes, gray as dust, poke and peck among the corn. As the light slowly fades, the gabbling of the geese and the crooning of the cranes grows even higher-pitched, anxious-sounding. The wind is still blowing and the sky, laced with the rippling clouds that signal good weather ahead, is flushed an improbable pink that fades to deep purple in the east. A few birds hop up nervously, flap for a few wingbeats, then settle down again. Without warning all the birds lift off as one, their wings making a roar that can be felt as much as heard. They fly like one great bird toward the marsh where they will roost for the night.

Almost before the flight has begun all the birds are gone, and the field is empty and still, except for the rustle of the cornstalks. What some have called "the last great wildlife spectacle in America" is over—until tomorrow. ■

FEATHERED FORESTERS

DWARF CASSOWARIES SOW THE SEEDS OF RAINFOREST GIANTS

TEXT AND PHOTOGRAPHS BY ANDREW MACK

On a rainy, starless night in the New Guinea rainforest, the only light is the eerie glow from luminescent fungi. A loud crack marks the end of a tree's hundred-year struggle to support tons of rain-soaked vegetation. Its bole snaps under the strain and the falling crown rips a hole in the forest canopy. Up on a ridge top, the falling tree wakes a cassowary, its shaggy plumage drenched by rain. The huge bird raises its body slightly from the ground, shakes the water from its back, and defecates, voiding a pile of seeds—all that remains of its late-afternoon meal of fruit from more than a dozen different tree species. Thus continues the cycle of death and regrowth in the rainforest, where cassowaries disperse seeds that grow to replace the trees that die.

Cassowaries are extraordinary birds. Related to emus and ostriches, they are the largest birds and the largest frugivores (fruit-eating animals) in any rainforest. All three of the world's cassowary species are found on the island of New Guinea, where I spent four years in a remote, pristine rainforest, studying the smallest species, the Dwarf Cassowary, which weighs in at a mere 50 pounds.

I was investigating the role these birds play in seed dispersal. Cassowaries eat prodigious quantities of fruit, which they pick from the forest floor and swallow whole. After passing through the digestive tract, the seeds from these fruits are voided in large droppings—up to four-and-a-half pounds in a single pile. To give you a sense of how impressive this is, an average-sized human would need to void several 15-pound droppings per day to match the output of a well-fed Dwarf Cassowary.

The prodigious rate at which seeds move through a cassowary's digestive tract piqued my interest. Where fruit-eating birds void seeds dictates where plants grow. When we walk through a rainforest admiring the trees, we are observing the results of thousands of past defecations and regurgitations. In other words, the defecatory behavior of frugivorous birds such as cassowaries plays a crucial role in determining the structure of the rainforest.

My work focused on how cassowaries disperse the large seeds of a tree that we called "Big Red" because of its huge scarlet fruits. At our study site, Big Reds (a member of the Meliaceae, or mahogany, family) are dispersed almost exclusively by cassowaries—the seed is too large for any other frugivore to move (with the exception of the Bare-backed Fruit Bat). Thus, Big Red seeds sprout trees where they do either because a cassowary voided them there or because they landed there when they fell from the parent tree.

I decided to compare the fate of seeds that cassowaries disperse to seeds that just fall from the tree. As a conservationist, I wanted to learn what long-term changes might occur in otherwise intact forests if cassowaries vanished. The largest terrestrial vertebrates in New Guinea, these birds are prized by the native people for food and ceremonial purposes. Where human population densities are high, cassowaries are often hunted out.

With the help of some indigenous Pawaiian hunters, I searched a 650-acre study area and mapped the location of all the adult Big Reds. Most rainforest tree species are naturally rare, and Big Red is no exception. We found only 64 of them—roughly one tree every 10 acres.

Anticipating when the trees would bear fruit, I tediously prepared hundreds of small nails by filing a unique code in each shank that would identify each Big Red tree. My plan was to find freshly fallen fruits, imbed the nails in their seeds, and replace the fruits where I found them. I hoped cassowaries would swallow the fruits and that we would later find the tagged seeds in the cassowary droppings. (Trial feedings with captive cassowaries proved this technique was completely safe.)

I figured that by recovering tagged seeds from droppings I could measure exactly how far the seeds had been dispersed. Usually it's extremely difficult to measure how far a frugivore moves a seed—most frugivores are small tree-dwelling or flying animals that eat small fruits. Yet seed dispersal distance has critical implications for conservation, population genetics, and forest regeneration. So as the fruiting season approached, I impatiently anticipated these ground-breaking data.

Some of the best-laid research plans go awry because the study organisms fail to cooperate. The fruiting season came, but not a fruit could be found. I was accustomed to the annual reproductive cycles of plants in North America, but many tropical plants fruit every other year, or even less frequently. As is the case for most plants in New Guinea, we know very little about Big Red's natural history; I could not even be certain whether the trees would fruit again during my study.

Fortunately, working with other uncooperative organisms had taught me the importance of always having several projects going simultaneously. For example, I had been collecting monthly data on where cassowaries defecate. Most of my study area was steep, so if cassowaries dispersed seeds randomly, most droppings should be found on steep terrain. My data, however, showed that seeds are usually deposited on level ground.

I wondered what the possible consequences of this nonrandom seed dispersal could be. The rainforest floor is a dangerous place for tender seedlings; they may get crushed by debris or stepped on by animals. So I constructed some artificial seedlings—two plastic drinking straws stapled in a cross, with a metal rod for a root—and "planted" them in transects on level and sloped terrain. Then I checked them monthly to see how many had been "killed," that is, flattened to the ground.

I found that artificial seedlings on level ground were less likely to be flattened than seedlings on slopes. More than 20 feet of rain falls at our site each year, so debris and leaf litter are constantly washed downhill. This debris buries and kills many seedlings that take root on slopes. On level sites, however—the location where cassowaries deposit most seeds—seedlings are less susceptible to this source of mortality.

But why do cassowaries most often defecate on level ground? I learned the answer after tracking cassowaries for months and conferring with the Pawaiian men, who have a tremendous knowledge of natural history. To birds that fly, seeds are just ballast—excess weight to be jettisoned as quickly as possible to minimize the energy expended in flight. Cassowaries, however, are flightless. Their flight feathers consist of a few barbless shafts that look like knitting needles. So jettisoning ballast is not a concern. Flying birds often defecate just before they take off, but cassowaries usually do not defecate until they are resting or at their overnight bivouacs.

We could identify these bivouac sites by the imprints

This is not just a Dwarf Cassowary eating a piece of fruit; it's also an ingenious natural system for planting the seeds of rainforest trees where they're most likely to survive.

BHL

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How far does a cassowary move a seed? Author Andy Mack stuck tiny, coded nails into the seeds of fruits. Cassowaries swallowed them, nails and all. Mack later checked droppings for labeled seeds. Trials with captive birds, above, showed that the technique didn't harm the subjects. Right, some of the seeds found in cassowary droppings.

of the bird's chest and legs in the soft ground; often a few feathers and a dropping or two also marked these sites. Like humans, cassowaries choose level sites to lie down and rest.

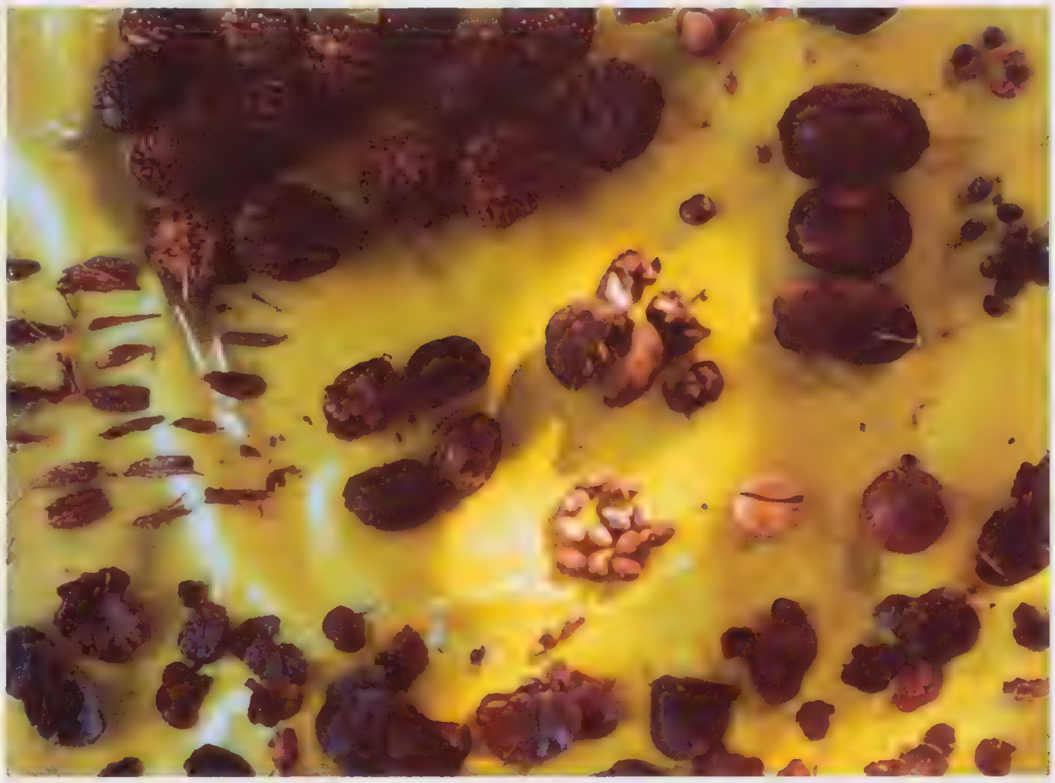
Unlike humans, cassowaries occasionally defecate while they walk, so we would sometimes find droppings along their narrow trails. And sometimes if I inadvertently came too close to a foraging cassowary while I was tracking it, I would literally scare the seeds out of it. (I nearly had the same reaction myself a few times. After all, cassowaries are among the few birds credited with killing humans.) But overall, most seeds were moved to the birds' rest sites.

When I wasn't skulking after cassowaries, I carried out seedling censuses on 270-square-foot plots to find out whether the distribution of seedlings reflected the cassowary's preference for level sites. I compared plots on level ground to nearby plots on slopes. The level plots had more cassowary droppings and vastly more seedlings than the other plots. In other words, the distribution of seedlings in this forest was significantly shaped by where cassowaries rest.

But is it important to Big Red to have its seeds dispersed by cassowaries? The seeds of many tropical trees will die if they're not dispersed—it's just too shady under the parent tree—but this is not the case with Big Red seeds. They sprout into big (30-inch-long)vigorous seedlings that fare well wherever they germinate. Most seedlings survive at least six years and some as long as fifteen years in the shade under a closed canopy. I monitored seedling growth for nearly three years and found that individuals in the shade grow less than two inches per year. At this rate it would take over 600 years to reach mature size. When I transplanted seedlings to open, sunny sites where trees had recently fallen, I found that seedlings responded dramatically within a few months, producing new leaves and growing tall more rapidly than they had during the previous 18 months in the shade.

Trees fall fairly often in rainforests, but where gaps will appear in the canopy is unpredictable. Cassowaries avoid treefall openings and rarely disperse seeds to these sites. The gaps are usually a tangle of fallen debris, vines and rapidly growing plants, difficult for a large biped to traverse (as I can attest); cassowaries simply go around them in the relatively open understory of the closed forest.

So it sounds as though Big Red seeds are at a disadvantage when they're dispersed by cassowaries, since they don't land in gaps where they can grow rapidly. Actually, they're not. Because they are dispersed by a creature that is unconcerned about ballast, Big Red seeds are huge, and they produce big seedlings. These seedlings can wait years for a tree to fall near them, then start growing.



Seedlings that sprout under the mother tree all share the same likelihood that an opening will form above them with the death of their mother. Dispersed seeds, on the other hand, have a higher collective likelihood that a tree will die above one of them. Thus, for Big Red, having cassowaries scatter its seeds widely is a good strategy. The seeds germinate and wait for a tree to die near them before shooting up to sapling size.

I still wanted to know just how far cassowaries disperse seeds. I waited patiently for my trees to fruit again, and in 1992 the swelling capsules that enclose the developing seeds began to appear. I got my tiny, marked nails out and waited for the bright red seeds to fall to the ground. In late June they began to fall and I started marking them. I even found that cassowaries were removing some of the marked seeds. Years of planning this experiment were finally bearing fruit (sorry!).

Another week went by and fruit fall increased. Simultaneously, I started to get a strange tropical illness. In a couple more days I was bedridden with a high fever. Then, to everybody's great amusement but mine I broke out in spots. I had the measles at age 34. This time the uncooperative organism was myself.

Unfortunately, the illness got worse and soon I could barely walk. A doctor we consulted over short-wave radio recommended that I be evacuated. We radioed for a chopper and I was taken to Goroka in weather that pilots normally would not fly through. I recuperated in town for a month, missing the peak of my long-anticipated experiment. Fortunately, my assistants carried on with the seed marking in my absence.

Later, after I had recovered and the last fruits had fallen, I systematically searched more than 1,000 acres of rainforest floor, looking for cassowary droppings with tagged seeds. A dozen Pawaiian men helped me search. These men were used to very strange behavior on my part, but I am sure they initially thought I was deranged to go to such efforts looking for bird droppings.

As days of searching turned to weeks, however, they began to share my anxiety that months of planning and tagging seeds would be for naught. Only after utter despair had set in did we find our first tagged seed. Never before have so many people been so overjoyed by the discovery of a bird dropping. We measured the distance back to the parent tree—over 600 yards.

By the end of the search we found 30 marked seeds. They had been moved an average of 425 yards; the farthest a seed had been moved was three-fifths of a mile from its mother. Clearly, cassowaries disperse seeds widely. As we measured the distances to source trees I noticed that most seeds were well uphill from their source. Not only do cassowaries prefer level sites, but they also like dry sites. (Who wants to sleep in the mud?) Most of the level, dry resting sites in my study area were on ridge tops, or on bluffs on the sides of ridges—uphill from many of the Big Red trees.

At the end of the fruiting season I found that 85 percent of the undispersed seeds landed downhill from their parent trees. Most seedlings that sprouted under parent trees were downhill from them (more than 37 feet on average); only a few were uphill from their parent trees. If we assume that every parent tree is eventually replaced by one of its seedlings, drawn at random from the entire population of seedlings, then according to these data the population of trees would move more than 130 feet downhill in just 10 generations.

This is what could happen to the forest in the absence of seed-dispersing cassowaries. Apart from the advantages dispersal provides in terms of positioning seedlings so that they can take advantage of canopy openings and avoid getting squashed by debris, dispersal is necessary simply to maintain plant populations in mountainous terrain. Where cassowaries are hunted out, big-seeded trees such as Big Red could become confined to the valley bottoms. This would fragment the population, isolating small groups of trees from one another. One tenet of conservation biology is that the smaller the population, the greater its chance of extinction. Cassowaries—and large frugivores in general—may play a critical role in the long-term maintenance of rainforest ecosystems in hilly country.

The main threats to New Guinea's rainforests—and indeed all rainforests—include logging, clearing for grazing lands, and clearing for croplands. All of these activities generally occur on level ground where road building and agriculture are easiest. The forests on the steepest hillsides are usually spared. Soon, much of the world's remaining rainforests will be confined to steep and inaccessible terrain. In these remnants, populations of seed-dispersing birds like the cassowary may be crucial for the continued health of the forest. ■

Andrew Mack is an ornithologist and ecologist who specializes in studies of tropical rainforests. He has worked extensively in Borneo and several areas in Central and South America.

BINOS FOR BIRDERS

Tips on choosing the best binoculars for your individual birding needs

BY KEN ROSENBERG

Thinking of buying a new pair of binoculars? Then read on. Whether you're shopping for your first binoculars or considering taking the big plunge and trading in your old clunkers for some new, top-of-the-line optics, this article will provide the basic information you need to make an informed purchase.

When choosing which binoculars to include in this review, we tried to find a suitable pair for every birder's budget and level of interest. The 25 popular models we looked at (and through) ranged in price from less than $50 to more than $1,000.

In our last major binocular review, which appeared in the Autumn 1992 issue of *Living Bird*, we chose the top-rated models in each price group. We now pit these binoculars against an assortment of up-and-coming new competitors. These newcomers include an impressive line of binoculars from Swarovski Optiks that will vie for a share of the big-spender market and a wider choice of affordable binoculars for birders on a budget.

Before you start seriously shopping for binoculars you'll need to make some important decisions. First, how much are you willing to spend on binoculars? Decide how much you can afford and then get the best binoculars you can find in that price range. But remember, binoculars are one of the most important tools of the trade for a birder. You will use them almost every day, often for hours at a time. The quality of your optics will definitely affect your enjoyment and effectiveness as a birder. Top-quality binoculars represent an investment that will last for years. Most high-priced binoculars carry lifetime warranties, which means that they may be the only binoculars you will ever need to buy. Inexpensive binoculars may look fine when they're new, but they are often easy to knock out of alignment and they're very susceptible to moisture damage in damp weather.

You must also determine your particular needs in terms of magnification power, field of view, durability, and weight. The features offered by each model often represent trade-offs between power and field of view, price and durability, or other factors. For example, my 10X binoculars have a slightly narrower field of view than a similar pair of 7X binoculars made by the same manufacturer. The increase in magnification power is worth the loss in field of view to me, but this isn't true for everyone. Some people who do most of their birding up close, searching for warblers and other quick, elusive songbirds in dense woodlands, often rate field of view higher than power in their list of preferences. Other people want to have the brightest image they can get in low-light conditions, and they're willing to pay the extra price and carry the extra weight to get the brightness they're after.

These are all things that you should decide before you make your purchase, but the bottom line should always be optical performance—will the binoculars provide a clear, sharp image of a bird without straining your eyes?

Always Test Before You Buy

Because judging the optical performance of binoculars is so subjective, there's no substitute for trying out binoculars before making a purchase. Remember that the binoculars you choose will become like an extension of your eyes and, just like skis or hiking boots, to be most effective they should fit perfectly. This is especially true if you wear eyeglasses (see sidebar on page 31). The right binoculars will guarantee your maximum birding pleasure; the wrong binoculars could at best dampen your enthusiasm for birding and at worst damage your eyes.

TIM GALLAGHER (2)

To help you decide which binoculars are right for you, we put each model through a series of standard (and some not-so-standard) tests. Our reviewers ranged in experience from casual birders among the Lab staff to members of the Sapsuckers, our crack World Series of Birding team. In addition to the easily measured specifications (weight, interpupillary distance, minimum focus distance, field of view) we attempted to test these binoculars under conditions that often challenge birders. We measured field of view at close range, where the limitations of a narrow field are most apparent.

We decided against putting any of these binoculars through our fogging test. You may remember that in our last binocular roundup we hosed down the binoculars in the garden, then put them in a refrigerator for 30 minutes. This hardly seemed fair to those binocular manufacturers who had never claimed that their products were water resistant. This time we just point out which models are guaranteed against fogging and which are not.

The results of these and other tests are displayed in the review chart. (For a real test, see if you can read the chart from across the room with your binoculars.)

Top Contenders—A Matter of Personal Choice

We began by comparing the top models from Bausch & Lomb, Zeiss, Leica, and Swarovski. Each company offers a 10X40 (or 42) and a comparable 7X42 or 8X42 model. All of us who looked through these binoculars agreed on one thing—we would be happy to receive any one of them for a birthday present. Each model offers superb optics, providing a bright, clear, crisp image to the viewer. It's truly a joy to look at a bird through any of these binoculars. As for which model to choose, again that comes down to personal preference. Some of our reviewers liked the wide, solid feel of the Leicas and Swarovskis; others liked the slimmer, lighter feel of the Zeiss and the Bausch & Lomb Elites. Whereas the Zeiss 7X42s proved to be the brightest binoculars we tested in our last review, our hats are off to Swarovski—their newly introduced 10X42s are as bright as the Zeiss 7X42s. The Swarovski models unfortunately have the greatest play in their focus (nearly double that of Zeiss or Leica), which could make it difficult to focus on a bird quickly. The Bausch & Lombs focus closer than the other models and the Zeiss are the lightest 10X binoculars in their class.

In our binocular comparisons, it didn't take long to see that the best binos are usually also the most expensive. The Zeiss 10X40s and Leica 10X42s, far left, and the Bausch & Lomb Elite 10X42s and Swarovski 10X42s, above, are all in the top performance (and price) class. To choose among them, look through each model to see which one is most comfortable for you to use.

As for 10X versus 7X or 8X, this is also a matter of personal preference. Some people like the lower-powered binoculars—they usually offer a wider field of view and a slightly brighter image than 10X binoculars, and "hand shake" may be less noticeable. But I personally prefer 10X binoculars for all types of birding, distant and close-up. I think that even when watching warblers and sparrows less than 30 feet away, the higher magnification power gives me an edge in making out hard-to-discern field marks. You should try them all out for yourself if you can, however, and find out what works best for you.

Mid-priced Choices That Really Work

For birders who crave superb optics but can't face spending $1,000 or hauling around a two-pound pair of binoculars, Swarovski has introduced the mid-sized 8X30s. These binoculars are comparable in nearly every regard to their more expensive cousins, but they weigh significantly less (only 21 ounces). They seem as bright as the Zeiss 10X40s and their field of view is

CORNELL LAB OF ORNITHOLOGY 1995 BINOCULAR REVIEW

Price range and model	*Suggested retail price*[A]	*Prism*	*Armor*	*Interpupillary distance (inches)*	*Good for eyeglasses*[B]	*Weight (ounces)*	*Play of focus*	*Minimum focus distance*	*Field of view at 30 feet*[C]	*Brightness*[D]	*Sharpness*	*Center-to-edge resolution*	*Rainguard*	*Waterproof*
Over $800														
Bausch & Lomb Elite 10x42	$1,800	Roof	Yes	2 3⁄16 - 2 ⅞	1	28.1	400°	11'	34"	90	Excellent	Excellent	Yes	Yes
Bausch & Lomb Elite 8x42	$1,700	Roof	Yes	2 3⁄16 - 2 ⅞	1	29.1	400°	10' 6"	43"	95	Excellent	Excellent	Yes	Yes
Leica ULTRA 10x42 BA	$1,195	Roof	Yes	2 3⁄16 - 2 ⅞	2	32	330°	13' 6"	28"	90	Excellent	Excellent	Yes	Yes
Leica ULTRA 8x42 BA	$1,145	Roof	Yes	2 3⁄16 - 2 ⅞	2	32	330°	12'	42"	95	Excellent	Excellent	Yes	Yes
Swarovski SLC 10x42	$ 994	Roof	Yes	2 3⁄16 - 3 1⁄16	1	30	630°	14' 6"	32"	95	Excellent	Excellent	Yes	Yes
Swarovski SLC 7x42	$ 943	Roof	Yes	2 3⁄16 - 3 1⁄16	1	30	630°	13'	48"	100	Excellent	Excellent	Yes	Yes
Zeiss 10x40 B/GAT	$1,360	Roof	Yes	2 3⁄16 - 3	2	26.4	330°	15'	29"	90	Excellent	Excellent	Yes	Yes
Zeiss 7x42 B/GAT	$1,252	Roof	Yes	2 ¼ - 2 15⁄16	1	28.2	330°	11'	51"	95	Excellent	Excellent	Yes	Yes
$500 - $800														
Swift Audubon 7x35 HFC	$ 675	Roof	Yes	2 5⁄16 - 3 1⁄16	4	21.7	455°	9'	47"	80	Very good	Very good	No	Yes
Swarovski SLC WB 8x30	$ 665	Roof	Yes	2 3⁄16 - 3	2	21	405°	15'	43"	90	Excellent	Very good	Yes	Yes
Bausch & Lomb Custom 10x40	$ 550	Porro	Yes	2 5⁄16 - 2⅞	2	30	470°	12'	28"	70	Excellent	Very good	Yes	No
$200 - $500														
Bausch & Lomb Custom 8x36	$ 475	Porro	No	2 5⁄16 - 2 ⅞	2	22.2	405°	6' 8"	38"	85	Excellent	Good	Yes	No
B & L Custom Compact 7x26	$ 450	Rev. Porro	Partial	2 ¼ - 3 ⅛	2	12.5	370°	7' 6"	45"	90	Very good	Good	No	No
Kowa BAK 4 Prism 10x40	$ 325	Porro	Yes	2 3⁄16 - 2 ¾	2	26	240°	15' 6"	26"	85	Good	Good	Yes	No
Nikon 8x40 Talon	$ 238	Porro	Yes	2 3⁄16 - 2 ⅞	1	28	170°	13'	38"	100	Very good	Very good	Yes	No
Nikon 7x50 Wolverine	$ 261	Porro	Yes	2 3⁄16 - 2 ⅞	1	35	185°	18'	37"	100	Very good	Good	Yes	No
Swift Audubon 8.5x44 BWCF	$ 495	Porro	No	2 3⁄16 - 2 ⅞	3	29	455°	15' 6"	42"	90	Very good	Very good	No	No
Swift Ultra Lite 10x42 ZWCF	$ 430	Porro	Yes	2 - 3	4	21	405°	14'	32"	90	Very good	Good	Yes	No
Swift Ultra Lite 8x42 ZWCF	$ 410	Porro	Yes	2 - 3	2	21	405°	13'	35"	95	Excellent	Good	Yes	No
$100 - $200														
Bausch & Lomb Legacy 8x40	$ 177	Porro	Yes	2 5⁄16 - 2 ⅞	2	26.8	270°	13'	32"	80	Fair	Fair	Yes[E]	No
Bausch & Lomb Legacy 7x35	$ 165	Porro	Yes	2 5⁄16 - 2 ⅞	2	24.6	270°	9'	35"	85	Good	Fair	Yes[E]	No
Bushnell Natureview 10x42	$ 191	Porro	Yes	2 5⁄16 - 2 ⅞	3	24	350°	11' 8"	28"	60	Fair	Poor	Yes	No
Bushnell Natureview 8x42	$ 159	Porro	Yes	2 5⁄16 - 2 ⅞	2	25.4	350°	9'	38"	80	Good	Poor	Yes	No
Under $100														
Bushnell Birder 8x40	$ 70	Porro	No	2 ¼ - 2 15⁄16	4	19.6	500°	11' 8"	34"	70	Fair	Poor	Yes	No
Bushnell Falcon 7x35	$ 43	Porro	No	2 ⅛ - 2 15⁄16	3	21	Instafocus	10'	31"	70	Good	Good	Yes	No

A = Suggested retail prices should only be used for comparison; actual retail prices are often substantially less.
B = Based on percentage of reduction in field of view with eyeglasses: 1 = no loss, 2 = < 10% loss, 3 = 10-20% loss, 4 = > 20% loss.

C = Actual field of view will vary among observers.
D = A comparative scale: 100 = brightest model tested.
E = Rainguard doesn't fit with eyecups folded.

similar to the Bausch & Lomb Elite 8X42s. Though they're not inexpensive, they are fully waterproof and carry a lifetime warranty.

In a slightly more affordable category, the Swift Ultra Lites are still our binoculars of choice. This year we tested the Ultra Lite 10X42s alongside the original 8X42s. Along with the same light weight, small size, and reasonable price, the 10X42s also provide the same bright, crisp image. My only disappointment is the field of view, which is narrow, especially for eyeglass wearers. We had proclaimed the Ultra Lites to be waterproof in our last review, but since then we've heard of several cases of fogging, including a pair that was ruined by moisture in tropical Costa Rica. We know several other Ultra Lite owners, however, who absolutely love their binoculars.

Nikon provided two binocular models from their Sky and Earth series for our review—the 8X40 Talons and the 7X50 Wolverines. The Talons are the better of the two for birding (the Wolverines are heavy and bulky and they don't focus close enough for some kinds of birding), but both of them are exceptionally bright and sharp. In fact, these binoculars are the brightest ones we tested. Except for their greater weight, the Talons compared very favorably with the Swift Ultra Lites. And unlike the Swifts, the Nikons showed virtually no loss of field looking through them with my eyeglasses on, though with both Nikon models I had trouble getting a single image at extreme close range.

A few quick words about the Bausch & Lomb Custom Compacts—if you're in the market for lightweight (12.5-ounce), compact binoculars, buy these. They're still the only compact binoculars we've seen that are really suitable for birding. They're tough, optically sharp, and they fit easily in a coat pocket.

Options for the Cash-conscious Birder

In general, opting to spend under $200 on binoculars means sacrificing some optical quality and durability. If you are a somewhat serious birder and plan to spend more than an hour or two a day looking through inexpensive binoculars, eyestrain could be a severe problem. (I had a splitting headache after spending an afternoon testing these models.) Unfortunately, our favorite model in this price range, the Bushnell Birder 7X35, has been discontinued by the manufacturer. What a shame. These binoculars were comparable optically to mod-

Ken Rosenberg, below left, and his team of experts put 25 popular binocular models to the test, spending several weeks trying them out on the optical bench and in the field. When the dust cleared, they had a list of binoculars for every price range and level of interest.

FOR EYEGLASS WEARERS ONLY

If you're like me, a birder who must wear eyeglasses in the field, you'll probably find that choosing binoculars requires some special considerations rarely mentioned in reviews of optical products. You may have suffered for years, peering through narrow tunnels and scratching the lenses of your eyeglasses before rubber eyecups became standard issue on most binoculars and scopes. Modern optics have improved immensely, but in terms of "eyeglass-friendliness" the various makes and models of binoculars vary greatly. It is therefore doubly important for bespectacled birders to test binoculars before buying them.

Although all the models we tested have rubber eyecups, not all eyecups proved equal. Apparently some optical manufacturers don't really expect birders to use the eyecups—either they're flimsy and hard to set, they won't stay folded, or the rainguard won't fit over the eyepieces with the cups folded. The biggest problem for eyeglass wearers, though, is tunnel vision—the limited field of view you experience when you can't get your eye close enough to the ocular lens. I measured the degree of tunnel vision by viewing a tape measure from 15 feet away in a brightly lit room, with and without my glasses on.

In general, the top-of-the-line binoculars have solved this problem admirably; I could detect virtually no loss of field with my glasses on with any of the expensive models, except the Leica 10X40s, which had a slight tunnel image. Some of the less expensive models also exhibited no tunnel effect—in particular the two Nikon models and the Bausch & Lomb Custom Compacts. In contrast, the Swift Ultra Lites were disappointing in this regard (their only negative feature), and virtually all of the models under $200 offered a very limited field of view for eyeglass wearers. Keep this in mind when you're choosing binoculars for children who wear eyeglasses. You'll find other comments in the "eyeglass friendliness" column on the binocular review chart.

For bespectacled birders, looking through binoculars can be frustrating. Your eyeglass lenses prevent you from getting close enough to your binocular eyepieces, so you end up with a dark, narrow, tunnel-vision view. What to do? Buy the most eyeglass-friendly binoculars you can afford.

els costing four times more; they were lightweight, had decent folding eyecups, and focused down to 10 feet—and they cost well under $100. Bushnell replaced them with the new Birder 8X40, which has a narrower field of view and is less bright and sharp than the original. The Legacy and Natureview models offer a passable image and they're rubber-armored, but the interpupillary distance is too wide for my eyes so I get a double image; also, on the Legacy the rainguard won't fit if the eyecups are folded. Given the differences in price, I'd opt for the less expensive Birder 8X40s and save my money for a better pair in the near future.

Finally, at a rock-bottom suggested retail price of $40, the Bushnell Falcons were a pleasant surprise. (I hardly expected to be able to make out a bird's image for that price.) Optically, the Falcons actually outperformed the new Birders. The light weight, small interpupillary distance, and "instafocus" mechanism makes this model the best choice we've seen for children—and just think, you could outfit an entire elementary school class for the price of a single pair of Zeiss 10X40s. But eyeglass wearers beware: you'll experience extreme tunnel vision looking through these binoculars with your glasses on, and the eyecups on the ones I tested kept popping back in my face. Maybe I'm expecting too much from binoculars this inexpensive.

So, whether you're shopping for your first or your final pair of binoculars, we've selected the best choices available. In most cases the price of the binoculars will be a major deciding factor. But if you're just starting out in birding, remember: it's a myth that top-quality optics are only for serious, experienced birders and that beginners should start with inexpensive binoculars. You don't need to prove your worth as a birder before purchasing a first-rate pair of binoculars. The crisp image, brightness, and viewing comfort provided by good binoculars will only speed up your progress in birding. If you can afford to buy the best binoculars, it's never too early to take the plunge. But if you can't justify dropping a small fortune on binoculars anytime soon, don't feel bad—reading this review and shopping carefully will help you get the best binoculars you can afford. ■

Ken Rosenberg is chief scientist of the Lab's Bird Population Studies program and also captain of the Sapsuckers, our official World Series of Birding team.

NATURE
in
HIS WORK

BY CYNTHIA BERGER

Artist Larry McQueen tells how he brings birds to life

Larry McQueen was fresh out of high school the first time he came to the Cornell Lab of Ornithology. On that summer day in the 1950s he borrowed his family car and set off on a pilgrimage, driving all the way from his rural hometown of Mifflinburg, Pennsylvania, to Ithaca, New York, to see an exhibit of original works by legendary bird artist Louis Agassiz Fuertes.

Last September, McQueen—now a major bird artist himself—returned to the Lab as a Monday Night Seminar lecturer. In an interview he reminisced about his first visit to the Lab as a teenager. With white hair and thick black eyebrows that give him a look of perpetual surprise, casually dressed in corduroys and a sweater that looked like an old friend, McQueen spoke softly and seemed reserved, a little shy—as perhaps he had been nearly 40 years ago. "I didn't try to meet anyone here, or talk to anyone," he said. "I just wanted to look around."

McQueen particularly remembered one display case that Fuertes, a Cornell graduate and Ithaca resident, had long ago set up to show the stepwise process leading to a finished illustration. "I studied that, and I thought to myself, 'Well, that's easy, I can do that,'" said McQueen. "When you're eighteen, you don't have much experience, so experience doesn't matter. It's what you think you can do that matters."

He smiled. "Of course, through the years, I've come to realize, I can't 'do that.' Each artist paints in a way that's different from any other. It's not even desirable to imitate."

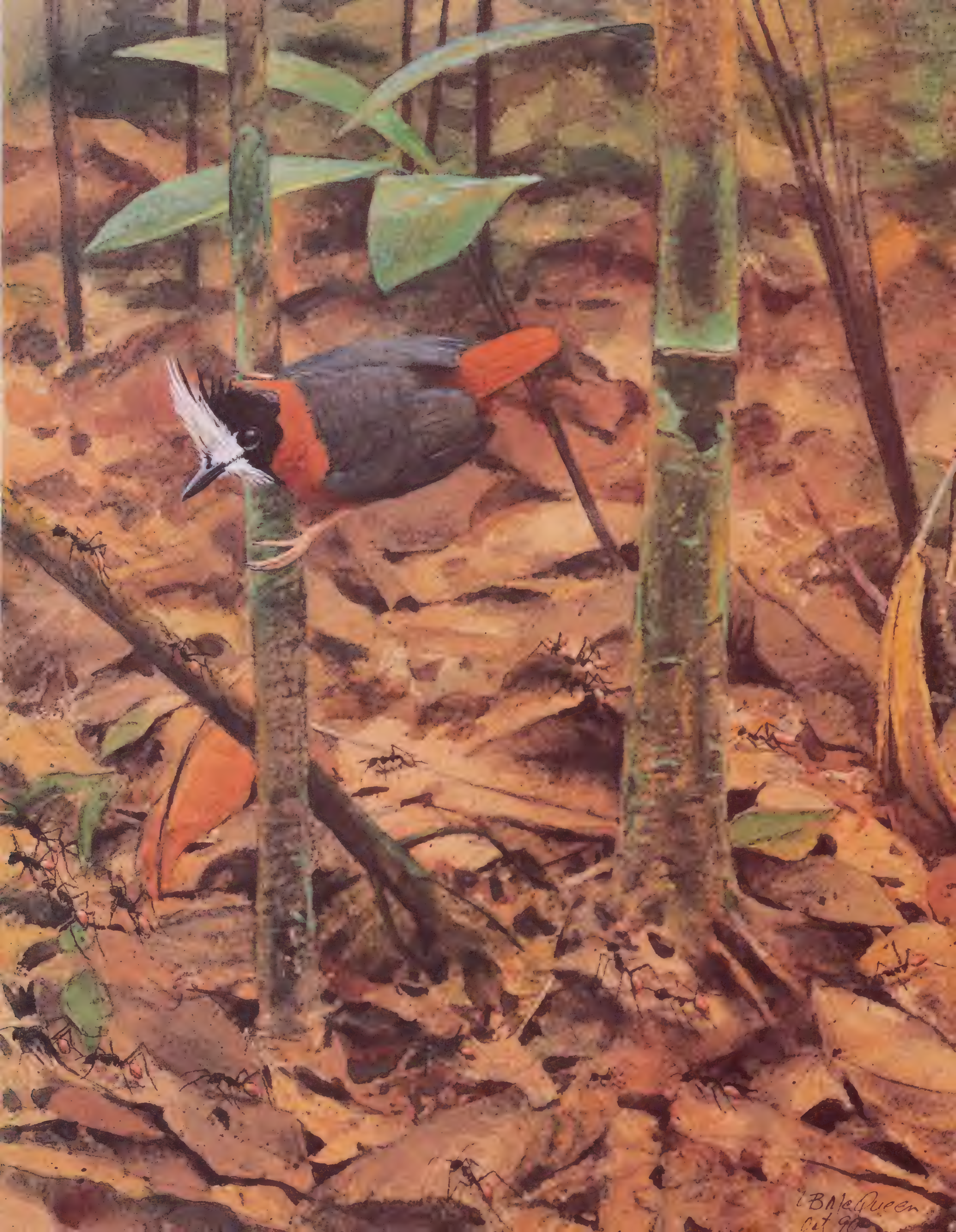
Although Louis Agassiz Fuertes died before Larry McQueen was born, McQueen has felt his influence since childhood, when his parents gave him a bird book with Fuertes illustrations (he used colored pencils to enhance some bad reproductions). So it was a poignant moment when McQueen stepped to the podium in the Lab's Fuertes Room, where a breathtaking panorama of Fuertes oil paintings hangs above the rich teak paneling.

His talk was titled "In the Field and in the Studio—How Bird Art Comes to Life." Before the lights went down, the artist reflected on how the works he knows so intimately had come to life for him the day before on a birding trip around Cayuga Lake. "We saw Wood Ducks and warblers and sandpipers," he said, "but what I really saw were Fuertes' Wood Ducks and Fuertes' warblers and Fuertes' sandpipers. So strong are his images that not only do you see nature in his work, but you see his work in nature.

"Fuertes was a master at capturing the personality of a species," McQueen continued, "and also at evolving a personal concept of a species. This is what I try to do too."

He went on to describe the strategies he uses to know a bird. Often he accompanies scientists who are banding birds so that he can hold the living bird in his hand. Lab scientist Ken Rosenberg says of a field trip with McQueen in Peru, "We pulled a Streak-necked Flycatcher out of a mist net, and Larry took the bird from us, held it at arm's length in his left hand, and painted with his right hand. Within fifteen minutes he had created a watercolor. It was one of the most incredible things I've ever seen. "

McQueen painted the White-plumed Antbird at right in watercolor on tan paper, using opaque white on the plumes as the only highlight.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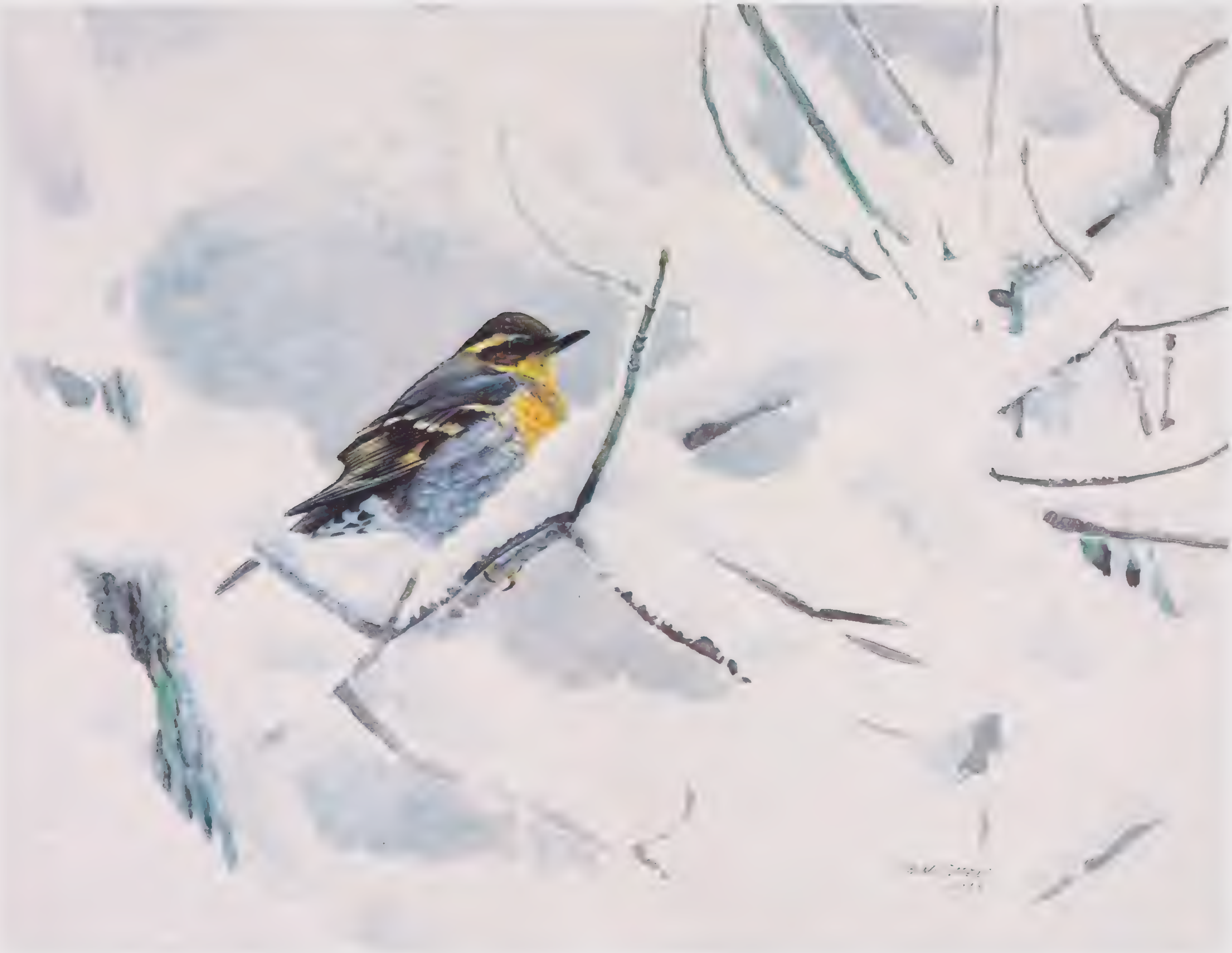
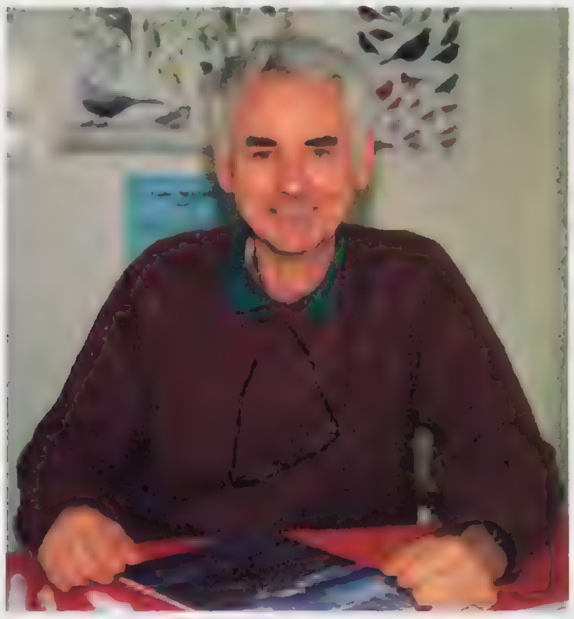


Below, artist Larry McQueen poses in front of his "Common Feeder Birds" poster during a recent visit to the Cornell Lab of Ornithology.



TIM GALLAGHER

In addition to field work, McQueen finds opportunities for careful bird observation at his backyard feeder in Eugene, Oregon, at zoos and aviaries, and in the "study skin" collections of museums. He also uses tools for seeing birds that Fuertes could not. "Television, believe it or not, can be an excellent resource," he says. "I'll tape a program and run it back at leisure. It's a chance to see how an unfamiliar bird moves and how its plumage behaves." He also brings a camera in the field to photograph his subjects ("Photography is another way of seeing") and sometimes he will use a tape recorder to entice birds out of hiding by playing back their songs.

In another section of his talk, McQueen described the painstaking process that goes into composing a poster or a plate for a field guide, where many disparate images must fit harmoniously together. He draws each bird, then photocopies his original drawings and cuts out the shapes, which he arranges on a large sheet of paper until he is satisfied with the composition. Finally he transfers the composition onto a sheet of watercolor paper and paints each bird. The "Common Feeder Birds" posters he created for the Lab's Project FeederWatch exemplify his blending of artistry with useful design.

Later in his talk, McQueen showed slides of some paintings from one of his most consuming current projects—painting hundreds of bird images for a landmark book, *The Birds of Peru,* by John O'Neill and the late Theodore A. Parker III. (O'Neill, a Louisiana ornithologist and bird artist, is also painting some of the plates.) The finished volume will show all 1,708 of Peru's bird species, many of them in more than one plumage; so far, about 70 of the approximately 125 plates have been completed.

McQueen also showed the work that led to this monumental assignment, a pair of Rufous-sided Towhees painted life-sized. Looking at them, you can almost hear the male's *chewink* and smell ripe blackberries under a July sun. *Towhees in Blackberries* was shown at the prestigious Leigh Yawkey Woodson Art Museum's "Birds in Art" exhibit in 1980. "John O'Neill was there, and he saw it. So he wrote me a letter asking if I might like to work on the Peru project," says McQueen.

"It was the most unexpected, exciting thing," he continues. "I'd always wanted to work in the tropics. When I said yes, O'Neill said, 'Well, we'll just send you down there, and you can spend three months to wander around.' I went, and I had the time of my life. I've been going back every other year—until 1990, when the political situation in Peru made travel dangerous." With the country more stable now, McQueen says there's a trip in the future—he plans to work on the antbird plates next.

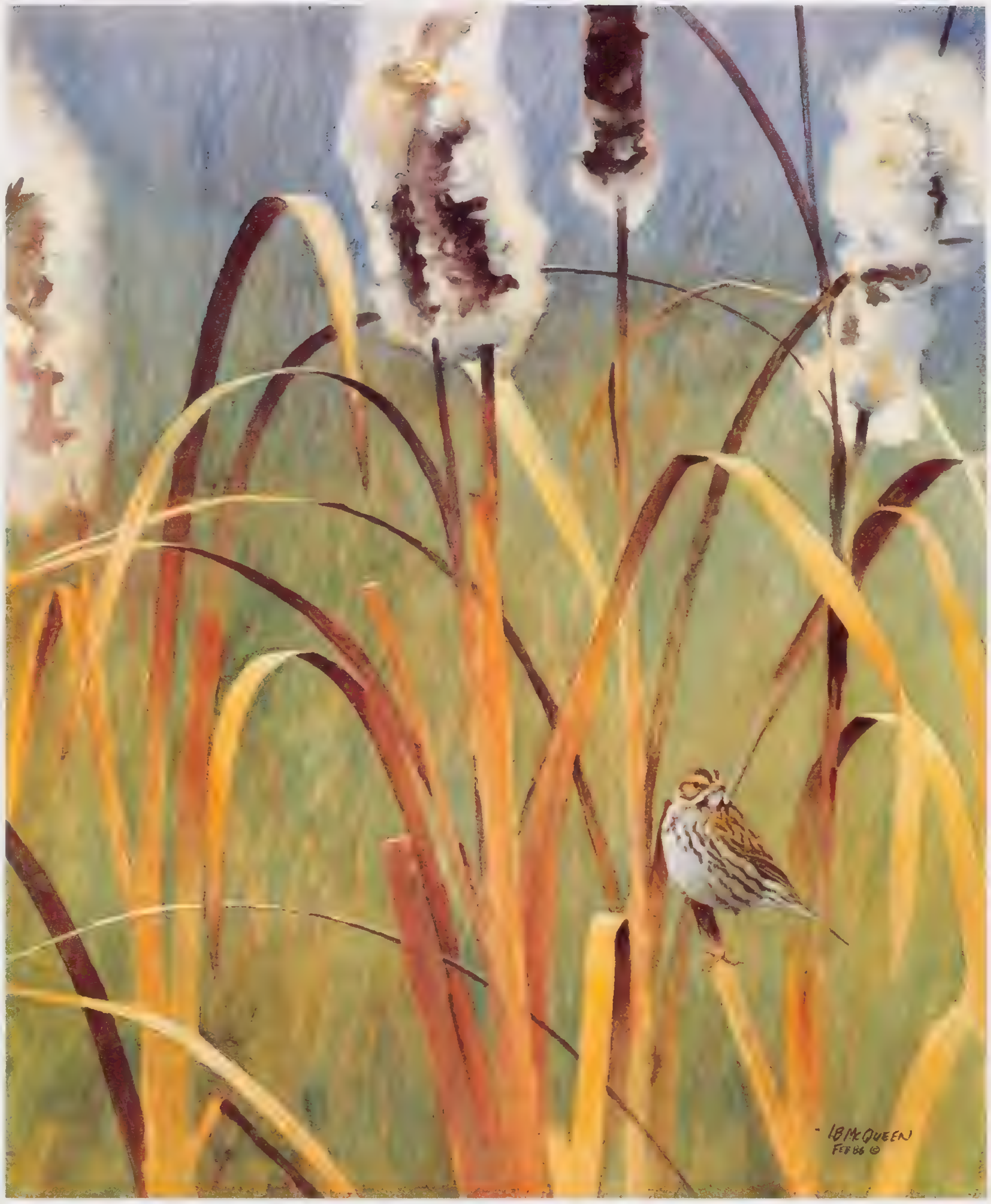
If you'd asked the 18-year-old McQueen his career plans, he probably would have said, "bird scientist," not "bird artist." He says that as a child he was notorious for wandering around his neighborhood in the early morning, bird watching. He started drawing to expand on the experience of being in the field. "I would be so excited about what I'd seen that I tried to recreate it on paper," he says. "I did that all through childhood. Still . . . it never occurred to me to be a bird artist, not for a long time."

He followed the path of the scientist instead, earning a bachelor of science degree at Idaho State University in Pocatello and even working with birds when he was drafted (the Army made him an ecologist with a biological warfare research unit). After the service he returned to Idaho to study the predator-prey relationship between pronghorn antelopes and Golden Eagles for the state's Department of Fish and Game.

But a career in fish and game management wasn't what he wanted out of life. "Art had been in the background up till then," he says. "Finally, I decided to study art." He painted houses to support himself while attending the University of Oregon, then worked for a while as a graphic designer, a job he says was satisfying and fun at first. "When I stopped learning new things," he says, "I realized I should strike out and become more independent as a bird artist—or I wouldn't have another chance." He's been painting full-time since 1977.

It was a good decision. Larry McQueen's illustrations appear in a number of field guides, including the Audubon Society *Master Guide to Birding* and the Reader's Digest *Book of North American Birds.* His work has been shown at juried exhibits across the country. In 1992 he was one of 30 wildlife artists invited by the Artists for Nature Foundation to document the remaining wild lands of Europe in a special book, *Portrait of a Living Marsh.*

In addition to *The Birds of Peru,* McQueen's current projects include a series of garden bird posters and some commissioned works. What would he do if he won the lottery? "Well, I've thought of that—although I never play the lottery," he says. "I have so many things I want to paint. I'd just want to get to them." ■



Varied Thrush in Snow, *shown at left, depicts a female that McQueen sighted near his backyard feeder. "The warm tones in her plumage against the snowy branches inspired this painting," says the artist. Of* Savannah Sparrow in Late Cattails, *above, he says, "I love the subtle markings that differentiate the species of sparrows."*

Tundra Swan, Detail

Natural History Art
John Parker Sherrod
18" x 24" on 90# 100% cotton rag
Limited Edition (950)
signed & numbered
$175 per print
To order please specify:
____Swan/Qty. ____Moth/Qty.
Ppd. (NM res. add 6.125% tax).
Send Name, Address, Zip & Phone
with Check or ____ MC ____ Visa
No.____________________
Expiration Date____________
to:
John Parker Sherrod LB
2118 Central SE, Ste. 32
Albuquerque, NM 87106

Cecropia Moth, Detail

Picture Perfect

BECOMING INVISIBLE

Text and photograph by Tim Gallagher

Make yourself less threatening to birds

Think how easy bird photography would be if you could become invisible whenever you felt like it. Then you could walk up to the most timid, spooky bird and snap picture after picture without being noticed. Sure, the bird might look up from its foraging once in a while, startled by the sound of your motor drive, but seeing nothing threatening, it would soon get used to the noise. What could be easier? What could be more effective? It's only a pipe dream, of course. But though you'll never be able to become invisible, you can at least make yourself less threatening to the birds you want to photograph.

The most obvious way is to set up a blind so that your human form will be completely hidden. Blinds are a great aid to wildlife photography and I intend to devote a future "Picture Perfect" column to their construction and use. Blinds are not appropriate for every photographic situation, however. What if you're hiking through a refuge with interesting birds all around you? No one's going to let you erect a blind in the middle of a sanctuary. Or what if you want to photograph shorebirds on a public beach or wild ducks in a city park? Again, in 90 percent of these cases, blinds are not an option. What else can you do? Learn how to become as nonthreatening as possible to the birds and other wildlife around you.

It's not as difficult as it sounds, though it helps if you were born with the kind of demeanor that animals feel comfortable with. No animal—tame or wild, bird, beast, or baboon—can stand to be near nervous, fast-moving, frenetic people who speak loudly and dash around constantly, waving their hands and arms in the air. To be an effective wildlife photographer, you need to cultivate a slow, deliberate, easygoing outward appearance, especially if you're not using a blind. Try to speak softly and move smoothly. Also, avoid looking directly at the birds you're approaching. In nature, the fixed stare of a predator usually precedes an attack. To avoid spooking wild birds, always look at them briefly and only with your peripheral vision, especially as you get closer. And don't move directly toward them; an oblique or even a zigzag approach is always more effective.

You should also dress in a manner that doesn't draw attention. This doesn't necessarily mean getting decked out from head to foot in elaborate camouflage with sludge-colored greasepaint on your face. Just avoid wearing bright, highly reflective clothes, such as white T-shirts or anything with loud, garish colors. Dress in muted earth-tones that match the general look of the habitat around you. For example, tan clothes work well in the desert lands of the Southwest, whereas in the Northeast dark greens blend more closely with the surrounding foliage.

The choice of material in your clothing is also important. I prefer to wear

100 percent cotton; it's generally cool and comfortable, and it's quiet when you move. I'm surprised how noisy some outdoor clothing is in the field. Pants that repel water while allowing perspiration to escape may be a miracle of science and incredibly comfortable to wear, but what good are they if they whistle every time one leg brushes against the other or when they rub against shrubbery? So always check out the noise level of outdoor clothing before you buy it.

Once you've learned to move slowly and smoothly in the field and you have appropriate clothes to wear, it's time to think about tactics for getting close to birds. One excellent method is to do nothing—that is, to find a likely place and wait for the birds to come to you. This is actually one of the most effective stalking techniques you can use, but it's not always as easy as it sounds.

To make the "sit-and-wait" technique work, you must be capable of sitting nearly motionless, sometimes for hours at a time. And you must also be good at choosing appropriate places to set up your camera, or you may wait a long time in vain for something to show up. If you really get to know a place, such as a marsh or other bird-rich locale, you'll soon learn which areas birds frequent at various times of the day, to forage, bathe, preen their feathers, or sun themselves. Such knowledge is golden for a bird photographer, making it possible to choose the most likely places to take various kinds of photographs.

Always take time to scout out a situation, especially in an area that's new to you. Find out what individual birds are doing—how they're foraging, what direction they're moving. You might be able to position yourself 100 feet or more ahead of a bird and wait for it to walk up to you. This works great on any kind of shoreline, be it an ocean, canal, or river. I've used this technique to photograph Sanderlings on California beaches. As they run along the wave edges, searching quickly for food before the next wave crashes down, the tiny shorebirds are completely engrossed in their task. Never remaining in one spot for long, they work their way down the beach. All I need to do is sit (or lie) on the sand and wait for my subjects to run tamely up to me so that I can snap portraits of them.

Sometimes in a sanctuary or a city park you can take advantage of human passersby to move birds toward you. Many ducks, herons, and other birds become habituated to humans in these kinds of places, though they still may be too spooky to let you walk up close enough to take full-frame pictures of them. But if you lie down quietly in a place that the birds tend to run or fly to when pedestrians frighten them, you should have plenty of opportunities to take good pictures—as long as you look less threatening than the people passing by.

You might want to try a more active version of the sit-and-wait technique. I sometimes like to put on chest waders and walk around in a pond or marsh, eventually finding a good place where I can hide with my camera and tripod in the reeds. I've taken some good shots of various grebe species in this way without a blind. I also sometimes walk into a shallow marsh, sit down, and plant my tripod legs firmly in the mud. I used this method many times to photograph avocets and stilts in California. Some of them would walk or fly quickly away and begin feeding in another part of the marsh, but they always ended up coming back to where I was sitting—usually in less than an hour.

At times I enjoy a classic stalk, attempting to approach a bird as closely as possible without flushing it. Stalking is always a challenge and it can be a lot of fun. It can also be very dirty—at least the way I do it, crawling on my belly through mud and slime to get close to some mysterious marsh phantom. The idea is to move extremely slowly and freeze whenever the bird looks up from its feeding or whatever it's doing. And don't push it. If the bird seems nervous, stay as still as a statue for as long as you can stand it. Move closer or begin taking pictures as soon as the bird is completely relaxed and has resumed its previous activity.

Remember that the ideal to strive for in stalking is to get as close as necessary, get the pictures you're after, and slip quietly away without flushing the bird. If you can do that, you don't need to be invisible. ■

If you sit still on a beach near the water's edge, you should be able to take close-up photographs of passing shorebirds like this Black-bellied Plover.

The Catbird Seat

MADE IN HEAVEN

by Pete Dunne

The maitre d' stepped to our table, interrupting our exchange of greetings and introductions.

"The New York call you've been waiting for, Madam."

"Please excuse me," the most beautiful woman in the world said, rising, leaving. She moved like a Roman goddess.

"What do you think?" Bob invited. "Isn't she wonderful?"

"She is," I agreed. "But next time you meet someone and decide to get married, give me and the airlines two weeks' notice or pick a best man on your side of the continent."

"What?" Bob said mockingly. "Not have the man who introduced me to birding supporting me at the altar? Unthinkable."

Bob and I go back a long way. Two bird-crazy kids who cut our teeth on Peterson. Though we hadn't seen each other since he moved to San Diego 10 years earlier, it was clear that Bob had lost none of his youthful exuberance. He lived, breathed, and slept birding. Until now, it had been his whole life.

"Where did the two of you meet?"

"At a desert rest area on I-10," he said. "A Black-throated Blue Warbler had been reported there."

"Soooo," I breathed in relief, "she's a birder?"

"A beginner," he affirmed.

"And you're her mentor?"

"Sort of," he replied.

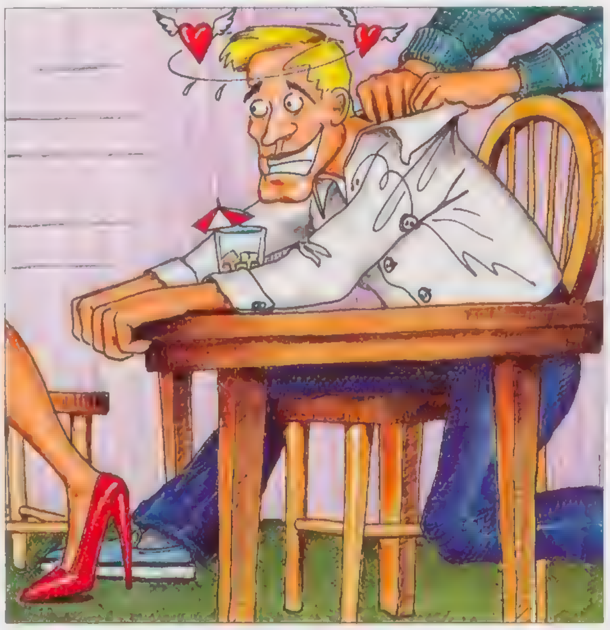
Bob must have noticed my perplexed look, because he added, "She doesn't know I'm a birder. When she backed into my car, my binoculars were still under the seat.

"It wasn't her fault," he continued. "I sort of stopped behind her car when a *Dendroica* flew across the parking lot."

"I see," I said, ignoring the chill running down my spine. "But she likes birds?" I asked hopefully.

"Of course!" Bob said (to my relief). "Why wouldn't she?" he added, ending that anxiety-free moment. My mind turned to the set of Stone's *Bird Studies at Old Cape May* I'd bought from a book dealer as a wedding present. I was wondering whether it was too late to exchange them for a crystal punch bowl when Bob continued.

"Do you think a Questar and Gitzo tripod combination is too heavy for someone who weighs 92 pounds?" he asked. "I'm afraid it might be, especially when you add the weight of the Sony TCD-D10 Pro II recorder and a Telinga parabolic mike."



"You bought her a Questar and a recording system for a wedding present!" I said, trying to make it sound like a question (and failing).

"Of course," he said. "She's the love of my life. Besides, where we're going, she'll need it. Go ahead," he demanded. "Guess where."

"The Islands?" I offered.

"Island! Singular," he said.

"*The* Island?"

"The Island," he affirmed. "Attu."

I tried to picture the moldy concrete bunker that houses Attu birders and apply the label *Honeymoon Suite*, but without success. "Isn't Attu a little rustic for a . . . uh . . . beginning birder?"

"There's running water inside now," he said defensively.

"There's always been running water inside," I said.

"I mean in pipes," he said, piqued. "Anybody can go to Hawaii for a honeymoon. But how many people can say they went to Attu? Think about it."

I did think about it. And I blanched.

"Have you told her where you're taking her?"

"It's a surprise," he said.

"You are sure she's an outside sort of girl?" I ventured.

"I told you we met in a parking lot; stop worrying."

"Well, what's her profession . . . I mean does she . . ."

"She doesn't have to," Bob interrupted, clearly annoyed by my lack of enthusiasm. "She has family money generated by some international concern specializing in pharmaceuticals, entertainment, and transportation."

At this moment my questions were interrupted by the return of Bob's intended.

"What did your godfather say?" Bob asked anxiously.

The bride-to-be seemed momentarily unhappy—which, if anything, made her even more beautiful.

"I didn't speak with him," she said. "He's on a trip to Bolivia. The call was from one of his, uh, lieutenants, who advised me to wait until Uncle gave his blessing before going through with the ceremony. I told him we were flying out tonight. I'm sure everything will be fine, though. I'm his favorite niece. He always says, whatever makes me happy makes him happy."

"And," she giggled, reaching for her wine glass and looking into her lover's eyes, "what makes me unhappy, he makes disappear. Poof." She smiled secretly.

Tearing her eyes away from Bob, she turned them upon me.

"Bob's told me so much about you, Pete. He said if there is anything not to like about him you are probably to blame."

"Incidentally," she added, "I gave my uncle's office your motel room number in case there are any questions. I hope you don't mind."

"Excuse me," I said to the two of them. "I'll be right back," I lied. ■

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LIVING BIRD

WINTER 1996 VOLUME 15 NUMBER 1

GREETINGS FROM SAPSUCKER WOODS

By the time you read this column, autumn will be a memory and we'll all be looking forward to the warmer days of spring. But as I write, fall migration is still in full swing and I've just returned from Cape May, New Jersey. There I saw some of my favorite raptors—Peregrine Falcons and Merlins—and countless other migrants en route to their faraway wintering grounds in Central and South America.

But watching birds was not my main reason for being there. I had come to attend a conference sponsored by Partners in Flight, an international coalition of scientists, agencies, organizations, and individuals dedicated to bird conservation. More than 500 people came—some from as far north as Alaska and Canada, others from as far south as Latin America.

The Lab of Ornithology was well represented. Several of our scientists and staff presented programs on the Lab's research and conservation efforts. And in the closing session, John Fitzpatrick, our new director, implored everyone present to be heroes in the struggle to protect the Earth. He spoke of the great conservationists of the past: Henry David Thoreau, John Muir, John Burroughs, Theodore Roosevelt, Aldo Leopold, Rachel Carson, and, most recently, Ted Parker, who died far too young "after showing us what boundless energy, talent, and devotion can accomplish in creating national parks in places where land was being feverishly destroyed." All of them are gone now and the world they left behind is still unstable. It is up to us to follow their lead and carry on their work . . . for the good of the birds, for the good of the Earth.

—Tim Gallagher
Editor-in-Chief

Cover: Is it time to head south yet? Looking cold and forelorn, an immature Great Blue Heron sits on the ground after a snowstorm. These stately wading birds sometimes linger late in the year at Sapsucker Woods until cold weather, ice, and snow make foraging impossible. Photograph by Donald M. Jones.

Right: A Greater Flamingo feeds in a salt marsh at Eilat, Israel. This famed migration spot hosts millions of birds—from tiny songbirds to huge eagles and storks—each spring and fall as they move to or from their wintering areas in Africa. Article on page 22. Illustration by John Schmitt.

Back Cover: Blink and it's gone. With only its dark eyes and bill visible, this White-tailed Ptarmigan in winter plumage blends in almost perfectly with the surrounding snow. Photograph by Donald M. Jones.

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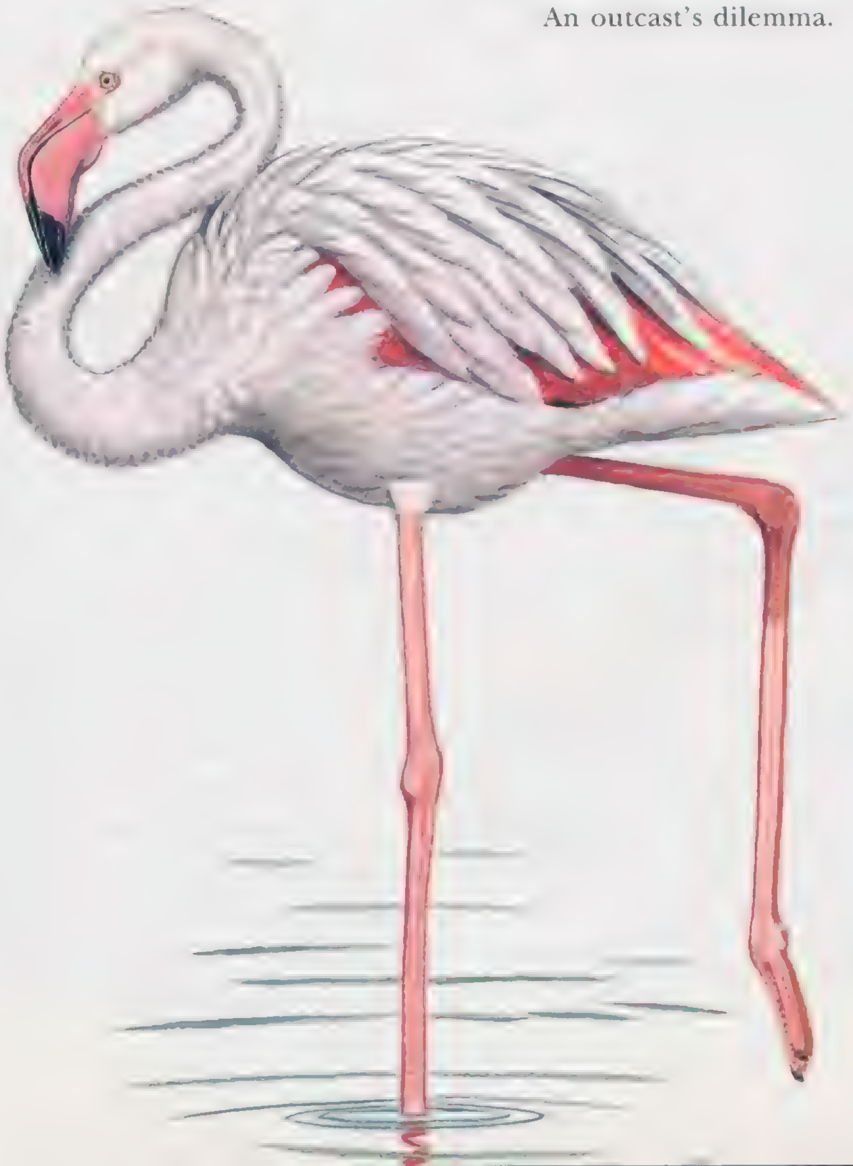

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Letters

GEESE BE GONE

The item on Canada Geese in "BirdNews" (Summer 1995) gave us a glimmer of hope. Our pond attracts a year-round flock of as many as 80 geese. With nearly a pound of droppings per bird per day, that gives us a ton of fertilizer per month. We have tried nearly every deterrent you mentioned, including methyl anthranilate, without success.

LANG ELLIOTT

Our only hope now lies in planting bad-tasting ground covers, but you did not mention what they are. Please, tell me the names of these plants, so that we may get some planted.

Phyllis Simpson
Haverford, Pennsylvania

*Paul Curtis, the Cornell University wildlife specialist who developed a methyl anthranilate treatment to repel nuisance geese, says tall fescue (*Festuca arundinaceae*) is distasteful to geese. Periwinkle (*Vinca minor*), Japanese pachysandra (*Pachysandra terminalus*), and English ivy (*Hedera helix*) are other possibilities. Avoid Kentucky bluegrass—the geese love it.*

MORE ON MIDGES

I was very interested in Jack Connor's column about swallows eating midges ("In the Field," Summer 1995).

I never paid these bothersome but harmless little critters any attention until I stayed for a time on Bathurst Island in the Canadian high Arctic. Here, where the summers are too severe for mosquitoes, they were by far the most conspicuous insect. On mild, calm days they swarmed over the wet tundra like smoke. There are no swallows to snare them in the air, but birds harvested them off the vegetation where the midges perch in cold or breezy weather. On the edges of lakes, midge bodies were often heaped into windrows by the waves, and here the shorebirds fed.

I have always wondered what brings birds from long distances to nest on the tundra, and it occurred to me that midges could be part of the answer. True, there are other attractions, especially the long days, sanctuary from enemies, and wet terrain, but the midges must figure in the food economy.

Harold F. Mayfield
Toledo, Ohio

NO THREAT TO PLANTS

In the Summer 1995 issue of *Living Bird*, Maeve Kim responded to my article about research on the Bicknell's Thrush ("Cutting Through the Fog," Winter 1995) with concern over the possible impacts of our field work on Mount Mansfield's rare alpine plants. We occasionally venture off the trail to search for Bicknell's nests, and Ms. Kim pointed out that rare tundra plants "are no match for sturdy hiking boots."

Indeed they are not. However, Mt. Mansfield's alpine plants are largely confined to the alpine zone—above treeline. Our study plots are located in the *krumholtz*—stunted forests of red spruce and balsam fir in the subalpine zone, where there are few, if any, rare alpine plants.

As ecologists concerned with conserving biological communities, members of the Research Department at the Vermont Institute for Natural Science (VINS) would not advocate or engage in the destruction of one rare species to collect data on another. Ms. Kim's concern for Vermont's fragile natural areas is shared by the entire VINS staff.

Steven D. Faccio
Woodstock, Vermont

We welcome letters from readers.
Address letters to: The Editors, *Living Bird*, 159 Sapsucker Woods Road, Ithaca, New York 14850.

BirdNews

Last August the American Ornithologists' Union (AOU) held its annual meeting in Cincinnati, Ohio. For nearly a week the Cincinnati Museum Center (a vintage Art Deco building that resembles a giant radio) reverberated with the excitement of bird scientists sharing their discoveries. Special symposia covered such topics as the impact of ecotourism on birds and the role of the AOU in bird conservation; the papers and poster sessions covered every bird subject imaginable. Here are a few of our favorites.

FAMILY MATTERS

Wicked stepparents harassing their stepchildren is a common theme in literary works ranging from *Hamlet* to *Snow White.* **Jill Goldstein** of the University of South Florida says Florida Scrub Jay family life follows the same plot.

The jays breed cooperatively, which means adult children help their parents raise new offspring. If a parent dies, the spouse may "remarry," presenting the helpers with a stepparent.

Goldstein studied these restructured families at Florida's Archbold Biological Station, where jay experts Glen Woolfenden and John Fitzpatrick (now the Lab's director) have accumulated 25 years of data on the resident population. The researchers had already noticed that young birds were less likely to help a stepparent of the same sex than one of the opposite sex. Goldstein wondered whether stepchildren were being driven from home by aggressive same-sex stepparents; another possibility was that the helpers were more likely to assist opposite-sex stepparents because they saw them as potential mates.

When Goldstein examined historical data, she found that female helpers were most likely to leave home if they were faced with helping a stepmother—a result that supports the Snow White model. Goldstein's field studies revealed parents are much more aggressive toward stepchildren of the same sex than toward biological children of the same sex.

Goldstein concludes that dominating behavior drives stepchildren from their homes; the possibility of mating with a stepparent doesn't keep them there. "Although Snow White and Hamlet were both harassed by stepparents," Goldstein adds, "only Snow White left home. Maybe Hamlet was reluctant to leave because, like male jays, he had an option that wasn't open to females: inheriting the home territory."

BILL KEATING

Florida Scrub Jays tell their story to Jill Goldstein.

PENGUIN STRESS TEST

Each year more than 50,000 tourists visit the Patagonian coast of Argentina to view South America's largest colony of Magellanic Penguins. That's enough company to put anyone on edge. Knowing that birders would hate to harm the creatures they come to see, Pomona College biologist **Gene Fowler** decided to measure the effects of tourism on the nesting birds.

He selected three different groups of penguins—some nesting in an area that tourists visited several times a day, others in an area that biologists visited once a day, and a third group that had no previous contact with humans. He conducted 5-minute nest watches in each area to see how often the birds acted alarmed or behaved aggressively. Fowler also collected penguin blood samples to measure the levels of the stress hormone corticosterone.

GENE FOWLER

Is a visit from Gene Fowler more stressful than 50,000 tourists?

Birds that were used to tourists barely responded to Fowler's visits, and their hormone levels stayed serenely low. Birds in the other two study areas, however, reacted to Fowler's presence with a flurry of alarm calls and aggressive moves, while their corticosterone levels zoomed three times higher than those of the tourist-acclimated birds.

Fowler concludes penguins do get used to having humans around, but it takes several years of repeated visits. He recommends that tour organizers confine their visits to a small area where birds are used to the stress of having visitors.

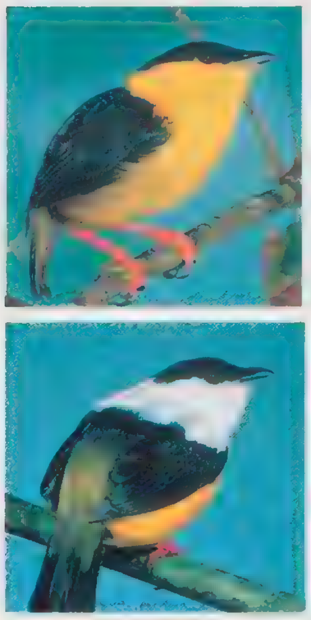
IN THE HYBRID ZONE

When two closely related bird species live in adjoining areas, they sometimes interbreed. If those two species are distributed over a broad geographic area, an entire "hybrid zone"

COMPILED BY CYNTHIA BERGER

may exist. Such zones are important because they can serve as genetic "corridors" that allow an advantageous trait to spread from one population to the other. **Robb T. Brumfield** and **Michael J. Braun** of the Smithsonian Institution's Laboratory of Molecular Systematics are studying an example of this phenomenon in two species of brightly colored manakins in western Panama.

The White-collared Manakin flaunts a broad white collar and bright yellow underparts; the Golden-collared Manakin has a narrow yellow collar and greenish underparts. Other Smithsonian researchers had previously determined that the birds in a 40-kilometer hybrid zone are genetically and morphologically identical to other White-collared Manakins—except their broad collars are yellow, not white.


J. DUNNING FOR VIREO

In mating contests, the golden collar may come out on top.

Manakins of all species perform communal mating displays that can involve as many as 20 males. Brumfield and Braun suspect that females of both species are choosing yellow males during these gatherings. And since a single male does most of the mating within a group, a new trait could spread rapidly from one population to the other.

If this hypothesis is borne out in behavioral experiments, it will be one of only a few confirmed cases where an advantageous trait has spread across a hybrid zone—a complex example of evolution in progress.

HIDE THOSE HUNGRY HOWLS

Squawking and shrieking, a hungry young bird asks its parents for food. But if the parents can hear that noisy begging, so can predators.

David Haskell of Cornell University wondered whether the danger of predation has shaped the sound of begging calls. His previous experiments had showed that begging is especially dangerous for the young of ground-nesting birds—possibly because more predators prowl the forest floor than the branches of trees. Perhaps, he reasoned, ground-based nestlings have evolved cryptic calls. Haskell decided to compare the begging calls of ground-nesting warblers such as Ovenbirds and Louisiana Waterthrushes to those of tree-based nesters such as American Redstarts and Black-throated Blue Warblers.

He turned to the Lab's Library of Natural Sounds for help selecting bird-sound recording gear, then headed for the woods to capture the sounds of begging baby warblers. He used Canary, the sound analysis program developed by the Lab's Bioacoustics Research Program, to examine his recordings.

Sure enough, ground-based nestlings had higher-pitched calls than their tree-based relatives. Haskell explains that high-pitched sounds have short wavelengths that get scattered and muffled by forest foliage. What's more, jays and crows don't hear high-frequency sounds very well. He concludes that for ground-nesting birds, predation has shaped the sound of hunger.

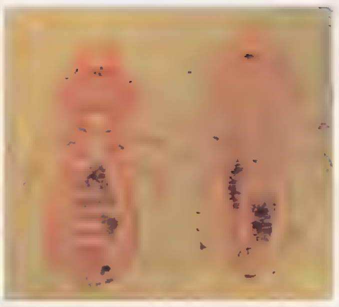
A LOUSY STORY

To birds, lice are an itchy annoyance. But to biologists **Caldwell Hahn** and **P. C. Osenton** of the Patuxent Wildlife Research Center and **R. D. Price** of the University of Minnesota, they're a source of inspiration. Recently, the trio used the tiny parasites to track the incursions of a much larger parasite, the Brown-headed Cowbird.

Female cowbirds lay their eggs in other birds' nests, where the greedy cowbird babies outcompete their foster siblings. Scientists think these habits may be contributing to population declines in some songbird species. But getting precise data on the cowbird problem is expensive. It takes a small army of trained workers to scour a woodland for well-hidden songbird nests.

Instead of tedious nest-searching, said Hahn, why not trap young cowbirds and collect their lice? Many species of lice occur only on a single species of bird. Newly fledged cowbirds might temporarily carry their foster parent's parasites. By identifying the lice, scientists would know what songbird species reared the cowbird—and get an idea of the local patterns of nest parasitism.

When the researchers trapped and de-loused some fledgling cowbirds, they found that 20 percent were infested (with what one louse expert calls "a staggering array" of species). Some of the lice were the kind that latch on to more than one bird species; still, the researchers could figure out the probable host birds for more than one-third of the lice-infested cowbirds. Hahn says the technique holds promise for sites where more time-consuming studies of cowbird parasitism can't be conducted.


ERIC HOBERG

One louse, one bird?

ANNE CHAZAL

AN APPLE FOR THE RESEARCHER

Some scientists use Macintosh computers to do their research. But **Cathy Stockton** (above) of Alabama's Auburn University goes low-tech—she uses a garden-variety apple.

Stockton is studying food preferences in House Finches. Male finches may be pale yellow, bright red, or any color in between; birds have the reddest plumage when they eat food containing carotenoids (the compounds that give autumn leaves their brilliant colors).

It just so happens that the ultra-red males are the most attractive to females. Knowing this, Stockton wondered if male finches can tell whether their next meal contains a dose of plumage enhancer. Birds have great eyesight, she reasoned, so maybe they prefer red foods.

This is where the apple comes in. Stockton used food coloring to tint some apple chunks yellow, blue, and red, then offered them to captive House Finches. She repeated the test with House Sparrows, which eat similar foods and have the same social system as House Finches—the big difference is male House Sparrows don't rely on red feathers to attract mates.

Stockton found that House Sparrows ate apples of all colors, but House Finches preferred red apple chunks to yellow and blue. These results suggest sexual selection has shaped the birds' food preferences. Stockton's next step? More low-tech basic science: documenting House Finch food choices in the field.

HAWAIIAN TREASURE

A few years ago, **Helen James** of the National Museum of Natural History discovered buried treasure in a lava-tube cave on the tropical island of Maui. No, not pirate gold or rich artifacts from an ancient culture, but scattered lumps of fossilized bird dung.

Why the excitement over ancient excrement? Bones, the most common fossil find, can tell us what extinct birds looked like and how they moved—but not what they ate. For James, the unique cave specimens are the equivalent of a 4,000-year old menu.

And for the extinct, gooselike bird that left its calling card in the cave, the blue-plate special seems to have been ferns, something few modern birds eat. Microscopic examinations conducted by **David Burney** of Fordham University show that the dung was laced with spores (the fern equivalent of seeds), which form only on mature fronds.

Ferns would make for a high-fiber diet, but compared to the scat of modern, grass-eating geese, the cave specimens contained little plant fiber. James suggests the flightless, browsing bird had a digestive tract with the unusual ability to break down fiber and extract the nutrients—perhaps through microbial fermentation. But a bird would literally need a lot of guts to do this job.

Happily, the bird's fossil bones provide evidence for this idea. Sturdy leg bones and broad pelvic bones preserved in the cave show the bird easily could have supported the weight of a vast digestive tract.

R. M. SEVERNS

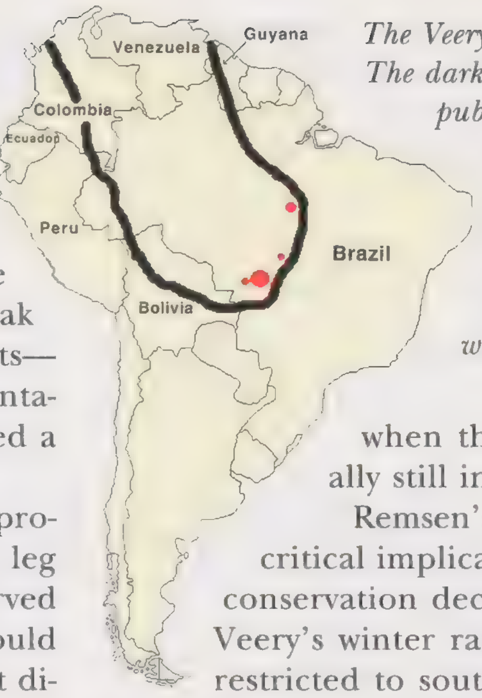
Helen James digs up the dirt on an extinct, flightless bird.

THE VEERY IN WINTER

Ornithologists are trying to pick apart the factors that contribute to dramatic declines in some populations of migratory songbirds. Is the root cause forest fragmentation on North American breeding grounds—or deforestation on wintering grounds in Central and South America? Before we take conservation action in either location, says **Van Remsen** of Louisiana State University's Museum of Natural Science, we need to address another problem: published information about these birds' winter ranges may be frighteningly inaccurate.

Remsen turned to the museum collections of the world to prove his point and chose the Veery, which has shown a slight but steady decline in numbers, for his test case.

Esteemed reference books map the Veery's winter range across a large part of South America, from northern Colombia and Venezuela south to Central Brazil. But data from museum specimens collected in the months of December, January, and February paint a very different picture, placing the Veery in an area of Brazil only 10 percent the size of the published winter range. Remsen says that in the past, scientists may have mistakenly classified birds collected in October, November, and March as winter residents when they were actually still in transit.



The Veery's winter range. The dark line delimits published range maps; dots show where birds were actually collected in winter.

Remsen's findings have critical implications for bird conservation decisions. "If the Veery's winter range is indeed restricted to southwestern Brazil," he points out, "then it coincides with an area that is rapidly being converted to agriculture.

Adds Remsen, "This whole exercise should raise some doubt about the published winter ranges of other species. I suspect the problem is reasonably widespread."

SEND IN THE COYOTES

If you were raised on Roadrunner cartoons, you probably don't think of Wile E. Coyote as a friend to birds. But that's how **Chris Rogers** of the University of Iowa describes coyotes—now that he's seen the results of a natural experiment in southwestern Michigan.

Rogers's research began as a routine study of Song Sparrows at Michigan State University's Lux Arbor Reserve. There, raccoons, opossums, and skunks are the usual reason that nests fail—all three mammal species love to make a meal of songbird eggs and nestlings.

Nature stepped in to manipulate the parameters of Rogers' study. During the three years he studied his sparrows, the local coyote population skyrocketed. Rogers couldn't help noticing that as coyotes increased, so did the sparrows' nesting success. In fact, the number of territories where parents successfully fledged young increased from 5 out of 24 in 1993 to 10 out of 21 in 1994 and 17 out of 21 in 1995.

Rogers thinks the coyotes might be controlling the raccoon population. And with fewer nest predators around, the sparrows can raise more young. It's too early to say whether future songbird management plans will call for coyote releases, but stay tuned.

BIRDING IN THE WASTELAND

by Mel White

The "Bayonet the Stragglers" Big Bend Expedition

Once, making that interminable drive from Dallas to El Paso, I pulled off I-20 for gas at Monahans, a town modestly celebrated for its local geological curiosity—a vast field of sand dunes carried in after the last Ice Age by the prevailing northwesterlies. As I stuck the nozzle in the tank and braced against my car, I noticed that the station's swinging metal oil sign was being held almost dead horizontal by the force 7 gale.

"Wow," I said when I'd fought my way inside to pay, "is it always this windy around here?"

"Naw," the mechanic said. "Sometimes it blows hard."

I remembered that meteorological observation last spring at nearby Fort Stockton, on a night when the wind was, in fact, blowing hard—hot, dry, smelling of a desert world. An even dozen of us rode in two identical blue Chevy Astros we'd rented at the Midland Airport. When we pulled into our motel at 11:00 P.M. it took both hands to push the van door open against the gusts.

I thought, Welcome to West Texas. Like they say, there ain't nothin' between here and the North Pole but barbed wire and antelopes. We got out, holding onto our hats, and huddled on the lee side of the vans to decide when to get up the next morning. The majority felt it would be nice to be on the road at six o'clock, to get to Big Bend National Park as early as possible.

By dawn the wind had dropped to a warm breeze. The sun was a pale fuzzy ball when we stopped along Highway 385, smack in the middle of a scrubby nowhere that one of those anti-environmental congressman might call a barren wasteland. It didn't seem bare to us, though. A birder's definition of wasteland is different: a mall parking lot, say, or a thousand acres of soybeans. In this parched and prickly place—exotic territory for people accustomed to verdant humidity—we heard Cassin's Sparrows sing, watched Vermilion Flycatchers in puffed-up display, and immediately began to tune out the incessant *chug-chug-chug* of innumerable Cactus Wrens. Lesser Nighthawks zigzagged erratically over the mesquite flats like big drunken bats.

Driving south, I observed hopefully to nobody in particular, as birders do, "This looks like a good spot for a Burrowing Owl." Not 30 seconds later somebody shouted, "Whoa, what was that on the fence?"

Snap U-turn. Two of the long-legged little jokers were flapping around among the lollygagging prairie dogs. They could have been omens, those owls, that this was going to be a very good trip.

One of us, a mannerly southern-gentleman type, had just finished a biography of Stonewall Jackson—the Confederate general notorious for marching his soldiers so hard they were known as the "foot cavalry." It followed, then, that in honor of one of the general's orders we became the Stonewall Jackson Memorial "Bayonet the Stragglers" Big Bend Expedition.

We could make a joke like that because we had no stragglers. We ranged in age from 15 to 58: two lawyers, a doctor, a nurse, a teacher, a house-

ROB CURTIS

"In this parched and prickly place we heard Cassin's Sparrows sing and watched Vermillion Flycatchers in puffed-up display."

builder, a couple of biologists, a social worker, a secretary, a student, and one guy—well, nobody's really sure what he does. Some had seen the Chihuahuan Desert many times; others hadn't been west of Fort Worth. Even so, it was a compatible group: all of us shared the opinion that the need for food and sleep is overrated. None of us minded a hike in the morning and another in the afternoon. For five days everybody uncomplainingly arose before dawn to walk the dry washes for Varied Buntings, and stayed out past dark to listen for Poorwills and wait for Elf Owls at their roost holes. The one sweltering afternoon when some of us chose to nap instead of going back to the Old Ranch water hole, we awoke to find "WIMP BIRDERS" written in the dust on the back of our van. Of course, that didn't hurt as much as missing the Peregrine Falcon.

Altogether, we didn't miss much. Checking vultures along the Rio Grande in the hopes of finding a masquerading Zone-tailed Hawk, we spotted a chunky flat-winged bird cruising east: Common Black-Hawk. Minutes later, as we picnicked in the shade of tall cottonwoods, a Gray Hawk sailed gracefully by. (Zone-tail came two days later, in the Chisos Mountains.) In the Basin, at an agave exploding with candelabra clusters of vivid yellow blooms, five species of hummingbirds hummed at once, including (for me, at last!) a brilliant male Lucifer. Hiking down the Window Trail—too late in the day, hot and tired—we'd just about given up on Black-capped Vireo, when, for no real reason, an optimist among us said we should keep going for seven more minutes. Another turn in the path and a pair of black-caps—the prettiest U.S. vireo, endangered by habitat loss and cowbird nest parasitism—flitted in front of 12 binoculars. "Seven more minutes" became an instant mantra and, by golly, it worked a couple more times.

In a way, the high point came as we were making the long climb up to Pinnacle Pass, when we heard our first Colima Warbler. Those who'd already been to Big Bend had never doubted that we'd see a dozen or more Colimas, so this was hardly a surprising find. Nevertheless, when a legendary star walks on stage it's a thrilling moment, even if you've seen the show before. The little gray-and-buff bird is found nowhere else in the country but these high Chisos forests, and for birders its modest song—a Pine Warbler's monotone with a final flourish—is the very siren call of Big Bend's grand wilderness of mountains, desert, and river canyons. From the first half-hushed "There it is!" to the last "I've got it!" those few minutes on the slope of Emory Peak were filled with the distilled spirit of what makes birding so happily addictive.

As for me, I'll remember the trip not for a bird, but for that spirit—as intangible, yet all-embracing, as the West Texas sky. Our eagle-eyed teenager (destined to be an ace, mark my words) recording lifers by the double-handful. Our *eminence grise* (so scrupulous he won't list a bird unless he's seen it well enough to know whether it needs a pedicure) studying his lifer Lucy's Warblers, a pair 10 feet away, after an hour of just-missed peeks. ("There, look! Is *that* close enough?") Bloody legs after plunges into the brush in search of a mystery chip or flirting tail feathers. And the eventual revelation, on face after face, that regardless of our birding luck we were in one of the earth's great natural areas.

One day, as we were going somewhere or other—driving those long, long dead-end roads is the price Big Bend demands for sharing its favors—I found myself thinking gratefully, as I have so often, of the magnificent places where birding has lured me. Would I have breathed the almost-not-there air of the Rocky Mountain tundra, if not for birds? Would I have flown from the Florida Keys to those insignificant sea-specks called the Dry Tortugas and seen sea turtles breasting the lucid blue waves? Would I have climbed the Maya pyramids at Tikal? Would I have seen the sunrise so many times?

If not for the birds, would I ever have come to Big Bend, so far from anywhere, so unconventional in its beauty? I doubt it. Or if I had, I might have been like all those "check-off-another-national-park" vacationers we saw at the Basin Lodge who seemed unsure of just what they were supposed to *do* here. They'd driven all the scenic drives, they'd gawked at Santa Elena Canyon, they'd crossed the Rio Grande and had a beer at a Mexican cantina. Now what?

Not long ago *Time* magazine, always sniffing for the spoor of the latest fad, reported that upscale baby-boomers are becoming "power gardeners," buying $1,500 watering cans and chic rocks for $2 a pound. (Hoo, boy, there aren't enough zeros in my computer to write how much Big Bend is worth . . .) It's easy to laugh at an editor in New York City describing trendies "nostalgic for a simple, agrarian past," but maybe there's a glimmer of insight in the story's hyped-up glitter. No doubt there are loads of folks in this fiber-optic society who are trying to remedy their alienation from the Earth, even if it's only vaguely sensed—to acknowledge an almost lost but instinctive truth, to wit: nature makes some marvelous things. More power to you, pruning-shears people.

One of the lawyers in our group, fresh from a long, high-pressure trial, embraced the spaces of Big Bend like a man just released from prison, breathed the desert air as if it were the perfume of Aphrodite herself. He got up mornings before everybody else, greeting the rest of us with the news that the stars were unbelievably bright. You had to smile, just watching him move through a cosmos where the rules are simple: the farther you go down the trail, the better your chance of finding what you're looking for; you run out of water, you go thirsty; you sit down in the wrong place, you get a butt full of cactus spines.

"There was never a traveler yet but who felt obliged to give his reasons for traveling," Alexandre Dumas wrote. True, and for our crowd the reasons are simple. We almost never ask: Now what? Whether we're searching cloud-forest trees for a glimpse of a quetzal or opening the kitchen window to hear a robin sing, we're never very far from the Earth, and the joy and renewal it offers.

We're birders. The whole world is our garden. ■

A RITE *of* SPRING

BY ALLISON CHILDS WELLS

On a Wednesday night in early April, I settle into the back row of the Fuertes Room at the Cornell Laboratory of Ornithology in Ithaca, New York. I've come to observe a course that after nearly two decades has become an unfailingly popular Ithaca mainstay.

> For nearly twenty years, Steve Kress has taught Ithaca about birds

It's called Spring Field Ornithology. Offered through the Lab as part of its public education program, this noncredit course is an eight-week birding extravaganza. Students attend Wednesday-night lectures on topics ranging from bird identification to nesting biology. Carefully planned Saturday field trips reinforce the lectures. On an excursion along Cayuga Lake, for example, students look for the waterfowl field marks described in class. At Derby Hill on Lake Ontario, they observe migrating eagles, vultures, and hawks sweeping overhead. The highlight is a weekend at New Jersey's Brigantine National Wildlife Refuge, where students are treated to views of Glossy Ibis, American Oystercatcher, Summer Tanager, and other species not found in Upstate New York.

Despite the course's official title, everyone I know who has taken Spring Field Ornithology refers to it as "Steve Kress's course." A research biologist with the National Audubon Society, Kress is best known for his work in restoring Atlantic Puffins to Maine. His restoration efforts have expanded over time to include terns, storm petrels, and other seabirds, not only in Maine but on the Galápagos Islands and Hawaii as well.

Kress's efforts in bird conservation have earned him a Rolex Award and a Times-Mirror Conservation Award. He's been featured in the *New York Times* and other major newspapers, and he's the author of several popular books, including the *Audubon Society Handbook for Birders*, *Bird Life*, and his latest book, *The Bird Garden*.

Kress received his bachelor's degree in zoology and master's degree in wildlife management from Ohio State University. Enticed by Ithaca's rich ornithological history, he arrived here in 1972 and went on to receive his Ph.D. in environmental education from Cornell University. Drawing upon his extensive educational

CHRISTOPHER CUNNINGHAM

Steve Kress, known world-wide for his conservation work with Atlantic Puffins, teaches Spring Field Ornithology to budding birders each year.

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background and teaching experience on Hog Island, a National Audubon Society camp off the Maine coast, he created Spring Field Ornithology in 1976.

On this Wednesday night, the second class meeting, the atmosphere is similar to what you might find at an amiable family gathering. Smiles are plentiful; greetings abound. Folks who have never seen me before ask what birds I've scoped out this week, and soon we're on a first-name basis.

Field trips supplement the weekly lectures. The grand finale is a trip to New Jersey's Delaware Bay at the height of spring migration, to experience birds like the Ruddy Turnstones, Red Knots, Dunlins, and Laughing Gulls, above.

SANDY PODULKA

When Kress breezes in, the twinkle in his eye seems to cast a cheerful spell over the room, silencing the chatter as though he were about to deliver the long-awaited punch line to a good joke.

And he is. Kress begins a discourse on mimicry using the Australian Lyrebird (he calls it the "liar bird") as an example and is interrupted midthought by a student asking why these birds sometimes sing at night. "For practice," Kress says, straight-faced. "If he sings at night, chances are his pals won't be around to laugh at him if he blows it." Laughter erupts and Kress grins—he's on a roll. When a woman asks why mockingbirds imitate other birds, he cocks an eyebrow. "Mimicry has its advantages," he says. "For males, it's like a badge that they can show off to attract females; for females, it's like being able to read their date's résumé." Before the chuckles subside, he continues with the story of a mockingbird that could imitate not only other birds but also a piano, a squealing pig, a human repeating the phrase, "Giddy-up, Bess," and even neighing Bess herself.

"There are ninety-eight people in the class this year," Steve reports when I meet with him in his office at the Lab of Ornithology, where he's an associate. "That's the highest total ever."

Most of the students in Spring Field Ornithology are from the Ithaca area, though each year a handful come from Binghamton, Watkins Glen, and other outlying communities (one year a woman flew up from Washington, D.C.). They represent a cross-section of ages and occupations—lawyers, landscape architects, homemakers, college students, and daycare providers. The most recognizable thing they have in common is their love of birds.

When I ask Steve how he's able to maintain his enthusiasm for the course after all these years, he says earnestly, "Nothing compares to seeing the look on people's faces when they see their first Black-throated Blue Warbler."

Although birds are the primary focus of the course, Steve says his ultimate goal has always been to raise people's consciousness about all of nature. "Birds are incredible creatures. They sing beautiful songs, and they're exciting to watch," he says. "I can't think of a better way to hook people into viewing the world around them as an environmental community that needs to be protected."

Such a process, he says, is an inevitable aspect of learning about birds. He teaches his students that an important part of bird identification is considering what kind of habitat they're in when they see or hear a bird. "By learning which birds prefer which habitat, people can't help but come to understand the interconnectedness, especially when you point it out to them in the field."

Underlying his goal, Kress says, is the need for people to realize how much fun birding is. "It allows you to use your senses to gain an expansive view of the world," he says, adding with a grin, "even if for some people it goes no further then knowing what 7:00 A.M. looks like."

On a crisp but sunny Saturday morning in May, I arrive at the Arnot Forest, a 4,000-acre preserve near Ithaca that's popular among birders. By 7:00 A.M. dozens of students have gathered in front of the lodge, ready to spend the morning observing migrating songbirds. Most of them spent the previous night in cabins at the site, having enjoyed late-afternoon birding, dinner at the lodge, a live owl show-and-tell by wildlife rehabilitators, and an owl hike before settling into their sleeping bags.

Soon the students have parceled themselves out into six small groups, each led by an experienced naturalist. I tag along with Steve's troupe. He's dressed unpretentiously in a baggy green sweatshirt and his trademark tam-o'-shanter.

We've barely left the lodge when someone asks, "What's that, up in the larch?"

"You tell me," Steve says.

There's silence as everyone focuses on the bird.

"It's a warbler," someone offers.

"How do you know?" Steve asks, the familiar twinkle in his eye.

The students pool their information. "It's small, and it's brightly colored." "Oh! There's yellow on the sides of its breast." "Its back seems bluish." "It's got yellow on the rump—it's a Yellow-rumped Warbler!"

Steve nods. "Yellow-rumped Warblers breed in coniferous trees. This one might be setting up a territory."

Though it's a chilly morning, there's warmth among the students. They listen intently to the songs and look in their guides for field marks. They compare binoculars and offer each other advice about footwear. Jokes and anecdotes fill in the lulls in bird activity.

STEPHEN KRESS

"Birds are exciting to watch. I can't think of a better way to hook people into viewing the world around them as an environmental community that needs to be protected."

As we stroll along, Steve points out trillium and other wildflowers, and the group is delighted to find a newt in its brilliant red eft stage. Soon we come to an area where the forest seems to tremble with feathers. We see Northern Orioles, a Scarlet Tanager, Rose-breasted Grosbeaks, vireos, and warblers, warblers, warblers. Everybody is thrilled, but no one more than Steve Kress. It's clear that no matter how many times in his life he sees these birds, it will never be enough.

Students bubble with excitement when I ask them what they think of Spring Field Ornithology. "Steve Kress is the reason this course is so terrific," says Jules Burgevin. He notes that Steve's knowledge is only part of it. "He has a laid-back kind of intensity that expresses itself in all aspects of the course."

Jules, a volunteer fireman and retired Ithaca College sociology professor, compares the course to a symphony. "The first movement gives you the basics of how to identify birds," he says. "When you're comfortable at that level, you're pulled along to a more challenging stage and so on until the final movement—Brigantine and the Arnot Forest, listening not only to bird songs but also their call notes."

Marge Devine enrolled in just the lecture section of the course a few years ago. She was so impressed that this year she signed up not only for the lectures but the field trips, too. Marge, who taught nutrition at the University of Maine and Cornell for more than 30 years, describes the course as "the most cohesive teaching unit I've experienced in all my life." This, she asserts, is a reflection of the course leader. "Steve gives credit where credit is due, and that means letting his trip leaders lead, in their own individual ways."

SANDY PODULKA (2)

> "Steve gives credit where credit is due, and that means letting his trip leaders lead, in their own individual ways."

Many of the trip leaders have gone on to distinguished careers in the biological sciences. Former Cornell student Mike Braun is now head of the Molecular Systematics Laboratory at the Smithsonian Institution. The Lab of Ornithology's director of education, Rick Bonney, and chief scientist for Bird Population Studies, Ken Rosenberg, were also trip leaders when they attended Cornell University.

Dave Nutter, an Ithaca environmentalist, has been a trip leader for five years and says he still gets excited about Spring Field Ornithology. "There's an inexplicable joy in connecting people to the environment, especially when they come from such different backgrounds," he says. "It's one thing everybody has in common, and the more people who care about it, the better."

Tony Gaenslen, a lawyer, and his wife Barbara Prudhomme, a psychotherapist, replanted their gardens and redesigned their landscaping because of the course. "It opened up a new world to us," says Tony, "and our lives are enriched as a result." The two recently enjoyed birding in Guatemala—something Barbara says they probably wouldn't have done if it hadn't been for the course.

Jerry Rivers, who runs a tree farm with Marge DeVine, says that what she gained by taking the course was a deeper appreciation for how much the natural world gives to human beings. "The course emphasizes things like pollination and other processes that take place because all of life depends on them," she says.

Adds Marge, "I think everybody should take this course. It's a real eye-opener."

Jules Burgevin couldn't agree more. "I heard about Steve and his course soon after it started up. Twenty years later, I'm finally taking it, and it's truly been one of the most inspiring experiences of my life. I think I'll probably take it next year, and every year after that till I die!"

When I arrive at the last class meeting, the students have just finished their dish-to-pass dinner in the Lab's observatory and are moving into the Fuertes Room for Kress's multi-media presentation, "Bird Islands of the North Atlantic."

"I blinked and the course was over," he says before showing the slides. Kress declares that the students have moved from the rank of "bird watcher" to "birder" ("Bird watchers make their identification *after* they put their binoculars down; birders make their I.D.s *before* they put their binoculars down"). He thanks the students and trip leaders, and they return the thanks with hearty applause.

Soon, the room is filled with the grunts and squawks of gannets and razorbills. A stunning image of a puffin appears on the screen; the bird's clownlike face peers directly into the lens. Kress can't resist the temptation to make one more joke. "This puffin," he says, "was peeking into the blind to see what kind of camera I was using."

The show ends with the image of Black-legged Kittiwakes swinging high over wild, rocky cliffs and a rough green sea. Kress sends his students off with a slogan that captures the spirit of Spring Field Ornithology. "Birds," he says. "May you enjoy them, wherever they may take you." ■

An overnight trip to Cornell University's Arnot Forest, above, helps students move up the ranks from bird watcher to experienced birder. Above left, trip leader Lynn Leopold helps students check a bird's identity.

Spring Field Ornithology celebrates its twentieth year this April. For more information about the course, or to enroll, write to the Bird Education Program, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. You may also call (607) 254-2440 or send e-mail to birdeducation@cornell.edu

Allison Childs Wells is a writer and birder who lives in Ithaca, New York. A former lecturer in writing at Cornell University, she is the assistant editor of The South American Explorer.

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THE TELLTALE TAIL

BY MARK WITMER

Solving the mystery of the orange-tailed Cedar Waxwings

Look closely at the Cedar Waxwings that flock to Sapsucker Woods in the fall and you'll notice that some have orange, not yellow, tail bands. What causes the anomalous color? Author Mark Witmer found out.

If you visit Sapsucker Woods in late September, you're likely to see large flocks of Cedar Waxwings. For a few weeks, from late September to mid-October, they feed voraciously on the plentiful red berries that still cling to the honeysuckle bushes. Then, with the passing of a cold front, the waxwings vanish.

As a graduate student at Cornell University, I enjoyed watching these gregarious birds. My primary motivation was to understand how Cedar Waxwings manage to survive while eating mostly fruit—an unusual diet among birds. A side benefit was the pleasure of watching birds as handsome as these, with their soft, brown and gray plumage and jet-black "Lone Ranger" face masks. Despite the overall subtlety of their plumage, Cedar Waxwings also have some colorful markings: bright red, waxy appendages at the tips of the inner wing feathers, warm yellow belly feathers, and a bright yellow band at the tip of the tail feathers. This yellow band is the focus of my story.

About 30 years ago, in the northeastern United States, biologists began seeing Cedar Waxwings with tail bands that were orange instead of yellow. The biologists noticed that most of these orange-tailed waxwings were young birds, which meant they had grown the orange feathers as nestlings, during the summer months. (Young waxwings retain these juvenal tail feathers until their second fall, when they molt and grow their first adult tail feathers; adult waxwings grow new tail feathers each fall thereafter.) The best historical record of orange-tailed waxwings comes from a 30-year bird banding study conducted at the Powdermill Nature Reserve in southwestern Pennsylvania by Robert Mulvihill, Kenneth Parkes, Robert Leberman, and Scott Wood. The first orange-tailed bird was banded at Powdermill in 1964. Between 1964 and 1971 fewer than 5 percent of young waxwings banded had orange tails. By 1980, however, that number had risen to 15 percent, and by 1985, to 25 percent.

The curious proliferation of orange-tailed waxwings was not confined to Pennsylvania. In central New York, the proportion of the population with orange tails has been increasing since the first specimen was collected in 1961. Orange-tailed waxwings are now fairly common throughout the Northeast and have also been sighted in Ontario, Canada.

Scientists found the sudden appearance of orange tail bands puzzling. Soon after the first orange-tailed waxwings were reported, University of Connecticut researchers Jocelyn Hudon and Alan Brush examined the pigments in waxwing tail tips to determine what was causing the new color. They found that both yellow and orange feathers contained a yellow carotenoid pigment; the orange feathers, however, also contained a red carotenoid pigment called rhodoxanthin.

Carotenoids are lipid molecules—as are fats and waxes. The waxy red tips that give wax-

MARIE READ

wings their name are composed of carotenoid pigments. Birds can't manufacture carotenoids inside their bodies; they must get these pigments from the foods they eat, although birds *are* able to biochemically convert some kinds of carotenoids into other kinds.

Thus the new color might be a consequence of either a genetic change enabling waxwings to convert dietary carotenoids into rhodoxanthin or a dietary change to a food that contained this pigment. Because most of the orange-tailed birds in the Pennsylvania and Connecticut studies were young birds, it seemed likely that the orange color was caused by rhodoxanthin in some food—a food that was available in the summer to nestlings but not in the fall to molting adults.

Cedar Waxwings with orange-tipped tails, like the one above, started showing up in the Northeast in 1964. Below, a side-by-side comparison of a normal waxwing tail and an orange tail.

Rhodoxanthin is not a common plant pigment, however. If Cedar Waxwings were getting it in their diet, what fruit was it coming from? Brush consulted with the Connecticut Department of Environmental Protection to identify plant species that not only had become widespread and locally abundant in the previous 30 years, but also produced red fruit during the summer, when nestling waxwings grow their tails. Of seven possible culprits, only one—Morrow's honeysuckle—had fruit that contained rhodoxanthin.

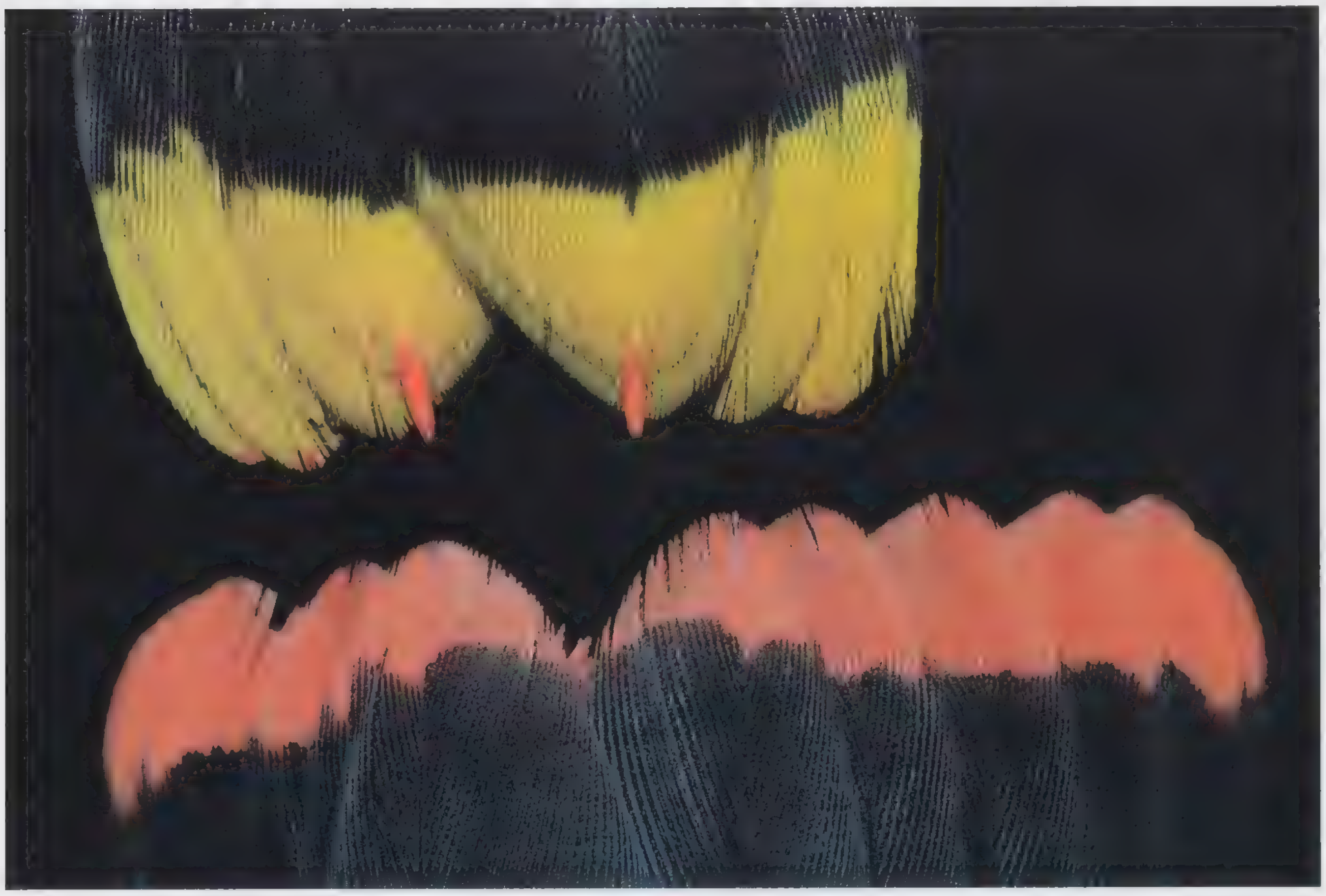
This shrub was introduced from Japan as an ornamental. Orange-tailed waxwings were first found at the Pennsylvania study site in 1964—shortly after the Pennsylvania Game Commission planted large numbers of honeysuckles there. Equally suggestive, the first orange-tailed bird recorded in New York State came from Painted Post, the site of a state plant nursery.

Was the rhodoxanthin in Morrow's honeysuckle responsible for a major change in the coloration of Cedar Waxwings? Probably. Studies conducted half a century ago in Germany had shown that several species of yellow-feathered birds will grow orange feathers if they are fed rhodoxanthin during molt. But direct evidence linking orange tails in Cedar Waxwings to a diet of honeysuckle berries was still lacking.

My thesis research wasn't originally designed to demonstrate this link—I was interested in exploring how waxwings survive on a sugary diet that contains little protein. But a couple of observations I made during my work left me with little doubt that eating honeysuckle berries caused waxwings to grow orange tails. First, when I examined birds from flocks that were feeding on honeysuckle berries in early October, I noticed that some individuals had a combination of new, orange-tipped tail feathers and old, not-yet-molted, yellow-tipped feathers. Also, during my feeding experiments, I found that if I fed Cedar Waxwings honeysuckle berries for one or two days while they were molting, they grew one or two orange-tipped tail feathers.

With this background, I performed an additional experiment to verify my observations. I used seven birds from my experimental group that were about to begin molting. I fed four of these birds honeysuckle berries during the entire molting period, while removing honeysuckle berries from the diet of the other three birds after half of their new tail feathers had started growing. Cedar Waxwings usually molt their tail feathers in a symmetrical pattern, starting with the central pair of feathers and proceeding outward, so it was easy to see when the birds were halfway through their tail molt.

The results of this experiment



TOP: MARIE READ. BOTTOM: STEVEN HOLT

JIM ROETZEL

Most songbirds eat a combination of seeds and insects, but Cedar Waxwings prefer fruit. An investigation by feather expert Alan Brush turned up only a few types of fruit containing the pigment that tints tail feathers orange.

were what I expected. Birds that ate honeysuckle berries grew tail feathers with bright orange tips. If they were deprived of honeysuckle midway through the experiment they subsequently grew feathers with yellow tips. My experiment showed not only that honeysuckle berries could cause the orange tail bands, but also that feather color changes abruptly when rhodoxanthin is removed from the birds' diet—within as little as three days. I concluded that the color of a Cedar Waxwing's tail is strongly influenced by what the bird eats while the feathers are growing.

My field observations also showed that the ecological interactions between birds and fruiting plants can vary a great deal over a relatively short distance. In Pennsylvania and Connecticut, most of the orange-tailed waxwings were young birds that had grown their colorful tail feathers as nestlings. Here in central New York, not only did about 40 percent of the young birds have some orange tail feathers, but so did about 80 percent of the adults in the large flocks I saw feeding on honeysuckle berries in the fall at Sapsucker Woods. Nearly all of these birds were in the process of molting their tails.

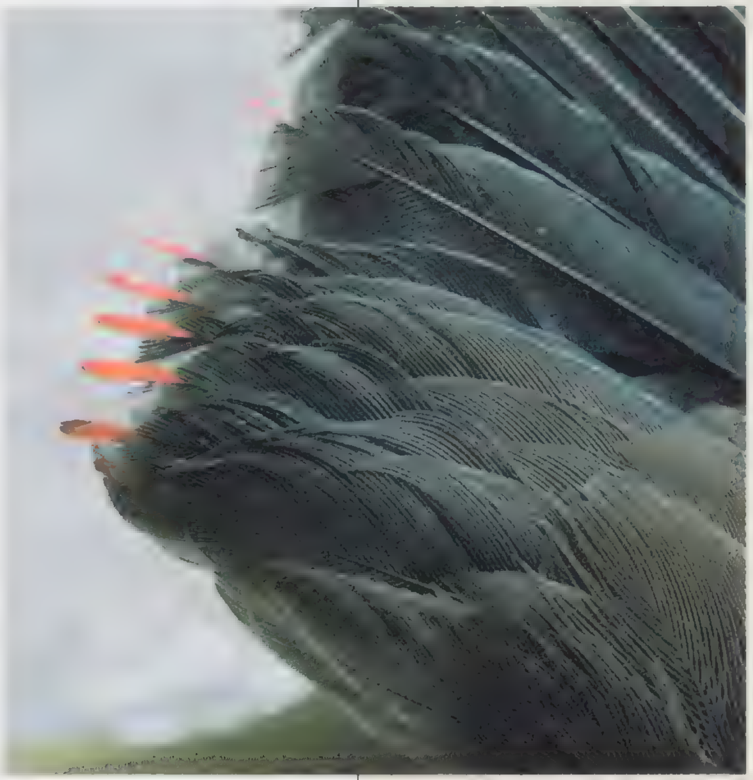
The difference in the occurrence of orange-tailed adults between southwestern Pennsylvania and central New York appears to be due in part to differences in patterns of fruit availability. In Pennsylvania honeysuckle berries are ripe during the nesting season but wither by late summer. Around Ithaca, however, honeysuckle berries persist until October, and adult waxwings that are growing new tail feathers eat them avidly.

Although most adult waxwings in the fall flocks at Sapsucker Woods were growing orange-tipped tails, come spring very few breeding waxwings have orange tails in the Ithaca area. This is probably because of this species' wandering habits—Cedar Waxwings do not always return to the same breeding sites from year to year. Birds that arrive here in the spring are not necessarily the ones that fed here in the fall. Similarly, young birds in the fall flocks at Sapsucker Woods are not necessarily birds that were raised here. They convene here from various breeding sites—some with honeysuckle shrubs and some without.

APPEARANCES ARE IMPORTANT

Banders at the Powdermill Nature Reserve have reported not only orange-tailed waxwings but orange-breasted chats and Kentucky Warblers with orange on their usually yellow chins, throats, breasts, and "eyebrows." In the last 10 years, banders in western New York have recorded eight White-throated Sparrows with orange instead of yellow feathers above their eyes.

All three of these species eat honeysuckle berries, at least occasionally. Thus, this introduced shrub seems to be having far-reaching effects on the appearance of some native North American birds.


GRANT HEILMAN PHOTOGRAPHY

These waxy feather tips (for which waxwings are named) may send a message to prospective mates. The structures get their color from a pigment much like the one that turns waxwing tails orange.

And appearances are important. Field studies show that among Black-headed Grosbeaks the most brightly colored males occupy the best territories. Dull males are relegated to the least desirable patches. In a recent laboratory study, male Zebra Finches wearing red leg bands were more attractive to prospective mates than males with green bands.

In sum, a change in a bird's color can affect its reproductive success. And for Cedar Waxwings, Canadian scientists D. James Mountjoy and Raleigh Robertson have some evidence that one colorful carotenoid-based feature—the waxy red tips on the secondary wing feathers—plays a role in mate selection.

The number of tips per wing varies—birds either have many, or just a few. Wingtip lookalikes tend to pair up; multi-tipped birds, who are usually older, choose multi-tipped mates; birds with just a few tips tend to have equally unadorned mates. The pairs with lots of tips seem to nest earlier, have larger clutches, and fledge more young than their neighbors with fewer tips.

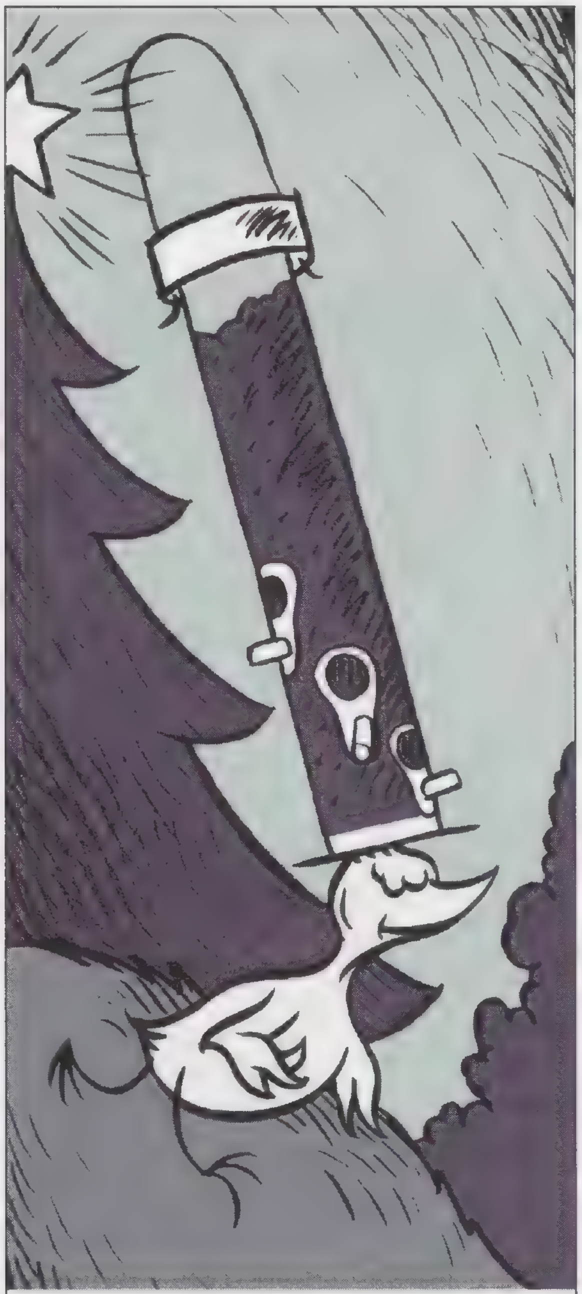
Mountjoy and Robertson suggest that the number of red tips may signal a bird's age and hence, its desirability as a mate (older, more experienced birds often have more luck raising a clutch than novices). Cedar Waxwings begin courting in their winter flocks—often months before breeding begins. The red tips could serve as an easy-to-see status symbol.

If wing tips signal age and experience, what message does a Cedar Waxwing's tail band send? We don't know yet. But given that the introduction of an exotic food has caused color changes in so many of our native bird species, this question calls for a closer look. *—Cynthia Berger*

The effect of Morrow's honeysuckle on Cedar Waxwing tail feathers shows that the consequences of introducing alien organisms to an ecosystem are difficult to predict. Ironically, even though eastern North America supports a variety of native fruiting shrubs, government agencies have encouraged both land managers and the general public to plant exotic honeysuckles as food for wildlife. Cedar Waxwings have taken advantage of this new food source, and their dietary shift has produced a striking plumage change.

But is this change harmful, benign, or beneficial? In some bird species where the male is brightly colored, females seem to choose their mates based on their flashy feathers. For example, ornithologist Geoffrey Hill has found that female House Finches prefer brightly colored males to those with dull plumage. (House Finches, like Cedar Waxwings, owe their bright feather color to carotenoid pigments.) Jim Mountjoy and Raleigh Robertson have presented evidence that the waxwing's bright wing tips—a carotenoid-based characteristic—may play a role in mate selection(see the sidebar above). Does a waxwing's orange tail also have an effect on its social interactions? There's room for fruitful study here. ■

Mark Witmer is continuing his studies of how Cedar Waxwings thrive on a fruit diet at the University of Wyoming in Laramie, where he is a postdoctoral researcher. The research described here will appear in an upcoming issue of The Auk.



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Eilat, Israel: Avian Crossroads of the Old World

TEXT AND PHOTOGRAPHS
BY REUVEN YOSEF

"Curioser and curioser," I muttered as I watched the huge group of flamingos foraging in the shallow lake. Seeing them feeding in their characteristic head-upside-down style, I couldn't help thinking of Alice in Wonderland playing croquet with the Queen of Hearts, using these bizarre, long-necked birds for mallets. On this, the birds' first day in this region after a long migratory journey, they ate voraciously, sieving the water with their bills to find small invertebrates, insects, crustaceans, and algae.

Millions of migrating birds depend on this vital area on the shores of the Red Sea

As I watched, I wondered where the birds had come from. Perhaps the immature birds—which made up the majority of the flock—had hatched earlier this year at Iran's remote Lake Resaiyeh. Or maybe they had come from as far away as Lake Tengis in Kazakhastan or the Gasan Kuli Reserve in Turkmeniya. And where did the adults in the flock winter last year? On the Indus-Ganges plains of India and Pakistan? Or did they fly south to Ethiopia? No matter, they had made their way to Eilat, Israel, and were now busily feeding and gathering strength to get them through the rest of their migration.

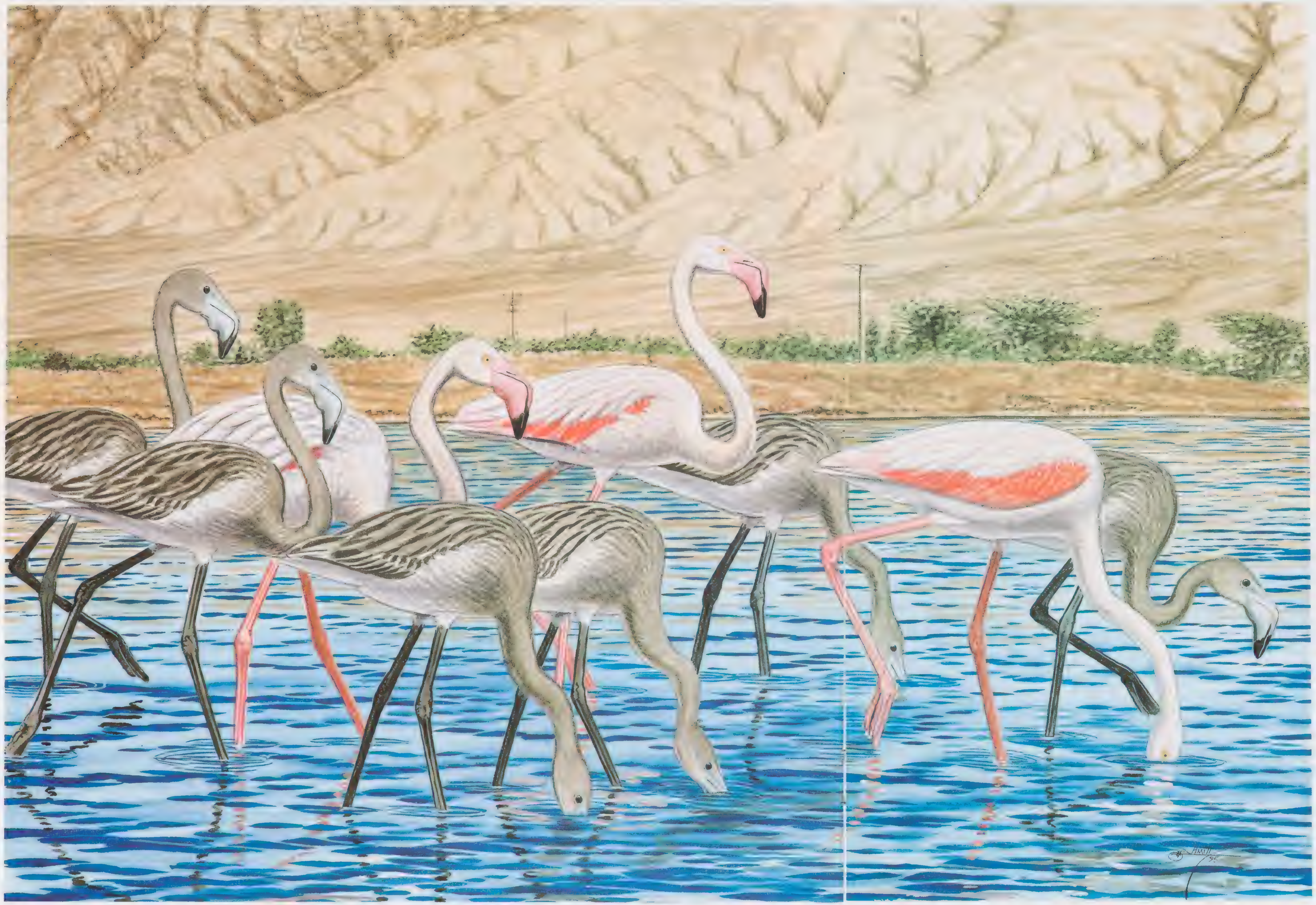

ILLUSTRATION BY JOHN SCHMITT

BHL

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The marshes and shrubbery in the Eilat area, above, must be a welcome sight to birds that have just crossed hundreds of miles of inhospitable desert. At right, Shelducks forage in a nearby marsh, gaining strength before continuing their migration.

With some of the bluest, clearest water and most beautiful reefs in the entire Red Sea, Eilat has long been recognized as a diver's paradise. But not many people realize that the city is located on one of the busiest avian flyways in the Old World. Researchers estimate that up to a billion birds pass through the area twice a year on their spring and autumn migrations. More than 280 bird species use Eilat as a stopover and staging area, resting and feeding before they begin the next arduous leg of their migration journey. In a soaring-bird survey conducted by the International Birdwatching Center in Eilat (IBCE) during the spring of 1994, observers spotted more than a million birds in just 92 days, including Honey Buzzards, Common Buzzards, Steppe Eagles, Levant Sparrowhawks, Black Kites, and some 30 other raptor species, as well as White Storks, Black Storks, and Common Cranes.

The birds' major migration routes follow topographical features associated with updrafts. Most soaring birds bypass the Red Sea, cut across the Sinai Peninsula, and converge at Eilat or slightly farther north. Some birds also cut across the Straits of Gûbâl, flying toward Ras Muhammad and Sharm el Sheikh. These flocks hug the cliffs along the Gulf of 'Aqaba coastline, heading north. But soaring birds are only the tip of the iceberg. Tens of thousands of nocturnal migrants, in-

RECYCLING A LANDFILL FOR BIRDS

The only "green" organization based in Eilat and fighting to preserve the area's unique salt marsh habitat is the International Birdwatching Center at Eilat (IBCE). Established 10 years ago to study bird migration, the group has become an active force in educating the public, promoting bird research and conservation of migrant species. The IBCE's staff is currently studying the effects of human land-use changes on migratory birds, and will now also take part in city planning with Eilat's civic government.

Two years ago, the city of Eilat provided a 50-hectare landfill for the IBCE to use in a "land recycling" experiment. From the early 1950s to the mid-1970s, the landfill had been a major dump. With numerous rusting cars, tires, rubble from old hotels, and various other refuse, it was an eyesore as well as an ecological hazard. The challenge was to take this ravaged landscape and change it into a bird sanctuary—aesthetically pleasing to human visitors, but more important, a vital refuge for wildlife.

Though Israel's recycling capabilities are extremely limited, the IBCE persuaded local building contractors to assist with the project. They helped to bury the garbage under clean earth that they had excavated in their building projects. The group then convinced the Jewish National Fund (Keren Kayemet LeIsrael) to let the IBCE be their representative in Eilat. Staff at the center ask tourists to participate in the "Plant a Tree in the Holy Land" project by planting native trees and shrubs at the recycled bird sanctuary. They forward the donations to Keren Kayemet LeIsrael, and the organization in turn supplies the IBCE with seedlings and irrigation supplies.

In planning the sanctuary, IBCE staff took into consideration the needs of a wide range of migratory birds that use the Eilat area for staging. Only species that fruit or flower during migration are planted in the sanctuary. In addition, the municipality and the water works allow the center to irrigate the trees with partially treated sewage water. Rich in organic matter, this water promotes extremely fast growth and higher-than-normal flowering and seed production rates.

Bird-friendly areas like this sanctuary are becoming more and more important around Eilat as surrounding natural areas are being changed to meet human (especially tourist) needs. Determining what these changes will mean for migratory birds that pass through the area will require long-term studies of the birds' biology and the effects of current land-use practices on them. One of the IBCE's principal roles is to conduct such studies. The staff is continuing to band passerines, a project begun in 1984. In addition, visiting ornithologists who stay at the IBCE facilities are banding waders, waterfowl, and raptors to enhance our understanding of the birds' migratory patterns. The IBCE is looking forward to more such collaborations with universities and conservation organizations from outside Israel.

The IBCE is a membership organization dedicated to conserving habitats vital to bird populations. The group invites students or birders with time on their hands to join them in their work. Volunteers stay for periods ranging from one to nine months. They can undertake independent projects or assist with larger projects, which currently include surveys of habitat use by various bird species, physiological status, behavioral ecology, diet during migration, and more.

For information on how to join the IBCE or participate in its programs write to IBCE, P.O. Box 774, Eilat, 88106, Israel.

A juvenile Red-backed Shrike, above, perches on one of the newly planted trees at the recycled landfill. As natural habitat around Eilat is altered or destroyed, bird-friendly areas like this new sanctuary are becoming more and more important for the well-being of migratory as well as resident bird species.

Only an area 800 meters long by 50 meters wide remains of the once-extensive salt marsh

cluding passerines, waders, waterfowl, and pelagic birds, pass through the Eilat area—the only land bridge connecting Europe and Asia with Africa.

Eilat is Israel's only port on the Red Sea. The city lies at the northern edge of the Sahara-Arabian desert belt—almost 2,000 kilometers of harsh, arid land. To the northeast of Eilat lie several hundred more kilometers of the Syrian Desert, and due east, the Arabian Desert. Eilat is a welcome oasis for exhausted migrants trying to cross the deserts. Willow Warblers, Eurasion Chiffchaffs, and Blackcaps are just a few of the species that use Eilat as a staging area, resting and building up fat reserves before completing their journeys back to their breeding grounds in spring.

One of the best places in the world to see massive concentrations of birds from a wide range of species, Eilat draws nearly 30,000 bird watchers each year. They come to see Bluethroats from Russia, Lesser Whitethroats from England, Little Stints from beyond the Arctic Circle, and several species of swallows from Europe. They also look for rare species such as Wrynecks and Corn Crakes that are difficult to see on their breeding grounds but relatively easy to find in Eilat.

Though Eilat has long been admired by ornithologists for its diversity of migrants, no one as yet has tried to determine how important this green oasis is to migrating birds. Other than random observations, overviews, and sporadic surveys of diurnal migrants, no studies relating to the ecological requirements of these migrants or the importance of this region to the breeding birds of Europe and Asia has ever been carried out.

Unfortunately, Eilat is a rapidly developing city with an exponential growth rate, and civic planners rarely take environmental considerations into account. Established in 1948 around a tiny police station on the west side of the Gulf of Eilat, the city initially expanded north and west, and is now spreading south toward the Egyptian border. Eilat has grown from a population of six policeman in 1949 to more than 34,000 residents by 1994. And no end to the growth is in sight. With an economy based almost entirely on tourism, Eilat is considered one of the most important foreign exchange "cash cows" for Israel's economy.

The habitat around Eilat, above, has changed radically since 1949, when the entire settlement consisted of only six policemen. Consequently, House Sparrows, bulbuls, and other species that tolerate human-disturbed environments are thriving, while species such as the Rufous-tailed Scrub-Robin, above left, and the Dead Sea Sparrow, below left, have become locally extinct.

This scenic coastal city is known for its *Sabha* (salt marsh) habitat. The marsh receives runoff from most of the nearby valleys when they flood in winter. The soil here has a higher salt content than surrounding areas, and most of the surface is covered by clay. These conditions produced a unique plant community dominated by sea blite, Nile tamarisk, and other species well adapted to salty soil. A number of irrigation and other water projects have been carried out since the mid-1950s. Hotels and lagoons have been carved out of the salt marsh, and large areas have been converted to agricultural fields. Only an area approximately 800 meters long by 50 meters wide remains of the once-extensive salt marsh.

The alteration and reduction in size of the salt marsh have allowed House Sparrows, bulbuls, and other species well adapted to human-disturbed areas to thrive here, while many indigenous species have become extinct lo-

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cally (including Rufous-tailed Scrub-Robin, Dead Sea Sparrow, and Northern Shrike) or have decreased to a worrisome level. The disappearance from the region of so many local breeding species is a clear indication that the habitat has deteriorated to the point where only the hardiest, most adaptable bird species can survive here.

Eilat's salt marsh has been a particularly vital stopover point for migrants—some of which may have flown for 20 to 40 hours, crossing 2,000 kilometers of desert without feeding. The plants here tend to fruit or flower during migration seasons, providing a protein-rich resource for many birds. Researchers have found that spring weights of birds caught farther north in the Mediterranean basin were considerably greater than those trapped south of Eilat. This suggests that migratory birds need to feed and build up their weight after crossing the desert. A far greater number of migrants stop over at Eilat in spring than in autumn. These fortunate individuals have overcome the hardships of autumn migration, over-wintering in Africa, and the first half of their spring migration. They are the fittest of their populations and comprise a substantial proportion of the breeding birds of Europe and Asia.

Eilat is a top draw for international birders, above, attracting more than 30,000 each year. Here they can witness enormous numbers of birds from a wide variety of species concentrated in a small area.

But the Eilat salt marsh these birds depend on may be a dying habitat. The remnants of the marsh are surrounded by agricultural fields or are heavily abused by military or local recreational traffic. If the rest of this habitat is lost, the implications for some migratory bird populations could be far-reaching, because they have so few alternative stopover sites in the area. And after leaving the Eilat salt marsh, the migrants must continue through arid regions for several hundred kilometers more before reaching another area where they can rest and feed. Some species are especially vulnerable because they have small bodies and carry just enough stored fat to get them across the hostile desert environment.

Of course, environmental changes have always occurred, influencing the patterns of bird migration. The species in existence today are the ones that proved best suited to these changes. But now many habitats are changing so rapidly that evolution cannot keep pace. The consequences could be dire, possibly leading to drastic declines or even extinctions in some bird populations. Unless we protect these areas, the birds that depend on them will not be able to complete their migrations, so whether or not their breeding and wintering areas remain intact will be irrelevant.

The points I've raised should cause great concern among people who want to conserve bird populations. At this moment, the last piece of Eilat's salt marsh is being fought over by a host of rival developers. Pisciculturists want to convert it into a fish farm, the local kibbutz wants to create a date plantation on the site, recreation interests would like to build a racetrack for off-road vehicles, and the tourist industry wants to erect more hotels and condominiums. The city of Eilat is leaning toward the latter idea, in the interest of financial gain. Although the IBCE is fighting to save the salt marsh and have it declared a nature reserve, one group working alone may not be enough to stem the tide of habitat destruction here. The only chance for preserving this crucial habitat is a concerted effort by the global community of conservationists to oppose the area's development. If Eilat's salt marsh is lost, it will contribute considerably to the already dangerous and unprecedented rate of extinctions and the reduction of the Earth's biodiversity. ■

Reuven Yosef is director of the International Birdwatching Center in Eilat.

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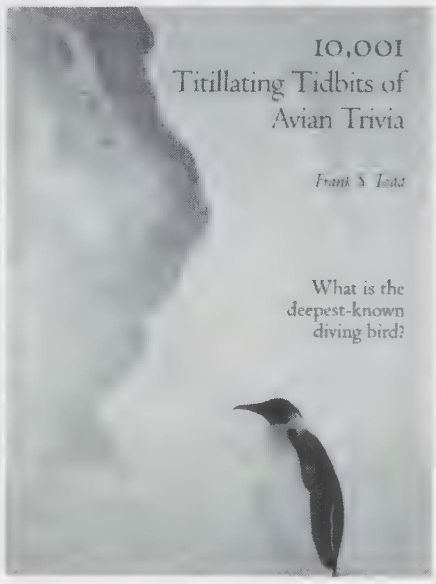

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A Field Guide to the Words . . . of Roger Tory Peterson

BY NATHAN COPPLE

Most people familiar with Roger Tory Peterson's field guides would surely describe him foremost as a gifted painter. In pigeonholing him primarily as a visual artist, however, we neglect his considerable skills as a writer. Indeed, the earliest editions of his bird guides were mostly prose. Color-plate reproductions were more expensive and difficult then; as a result, the birds were tiny, simplistic, and often black and white—more like diagrams than full-fledged portraits.

> This gifted artist's writing evokes images as vivid as his artwork

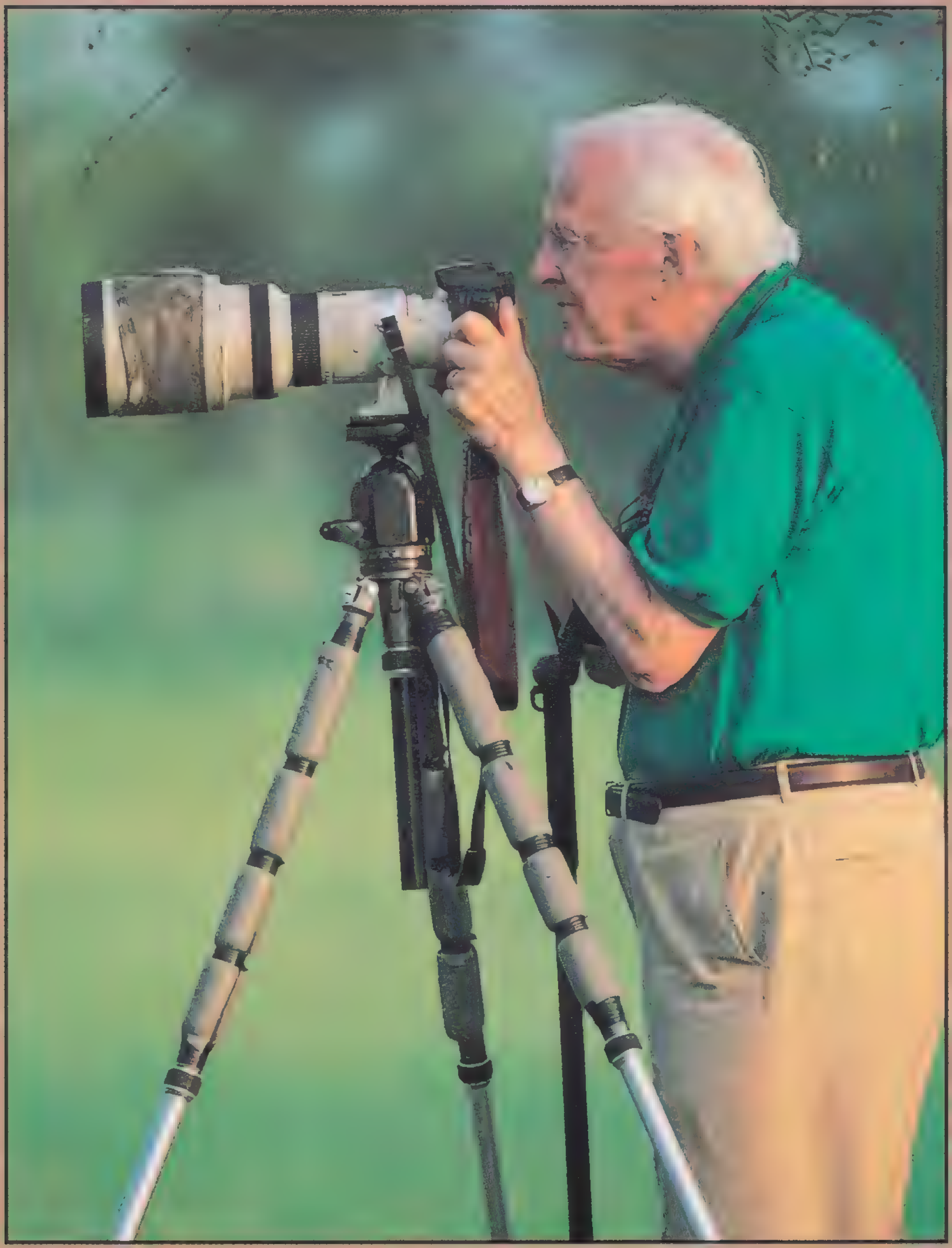
As the artwork in each subsequent edition expanded (and improved), so the narrative correspondingly contracted (and improved too). The bottom-line message of Strunk and White's famed *Elements of Style*, "Omit needless words," was not lost on Peterson. In the second edition of *A Field Guide to Western Birds* (1961), the Canada Goose got an entire page of prose; by the third edition (1990) this passage had been reduced to 10 lines, all of them golden. With this condensation the language has become more colorful, more evocative, more poetic. It is as though all of his drawing on the right side of the brain has spilled over into the writing on the left side of the guide.

As we might expect of an artist, Peterson excels at evoking color. The Piping Plover, for example, is "as pallid as a beach flea or sand crab—the color of dry sand." The Purple Finch is rendered "like a sparrow dipped in raspberry juice." "A wash of gold" graces the Golden Eagle's neck. And the Elegant Trogon's belly is "geranium-red." Even the names of the colors—vermilion, buff, smoke—come straight from an artist's palette or paint box.

Shapes, too, flow easily from this painter's pen. The outline of a loon is "hunch-backed, with a sagging look," while a Vaux's Swift is "like a cigar with wings." The Sandhill Crane has a "bustle-like rear," and Snowy Egrets wear their famous "golden slippers."

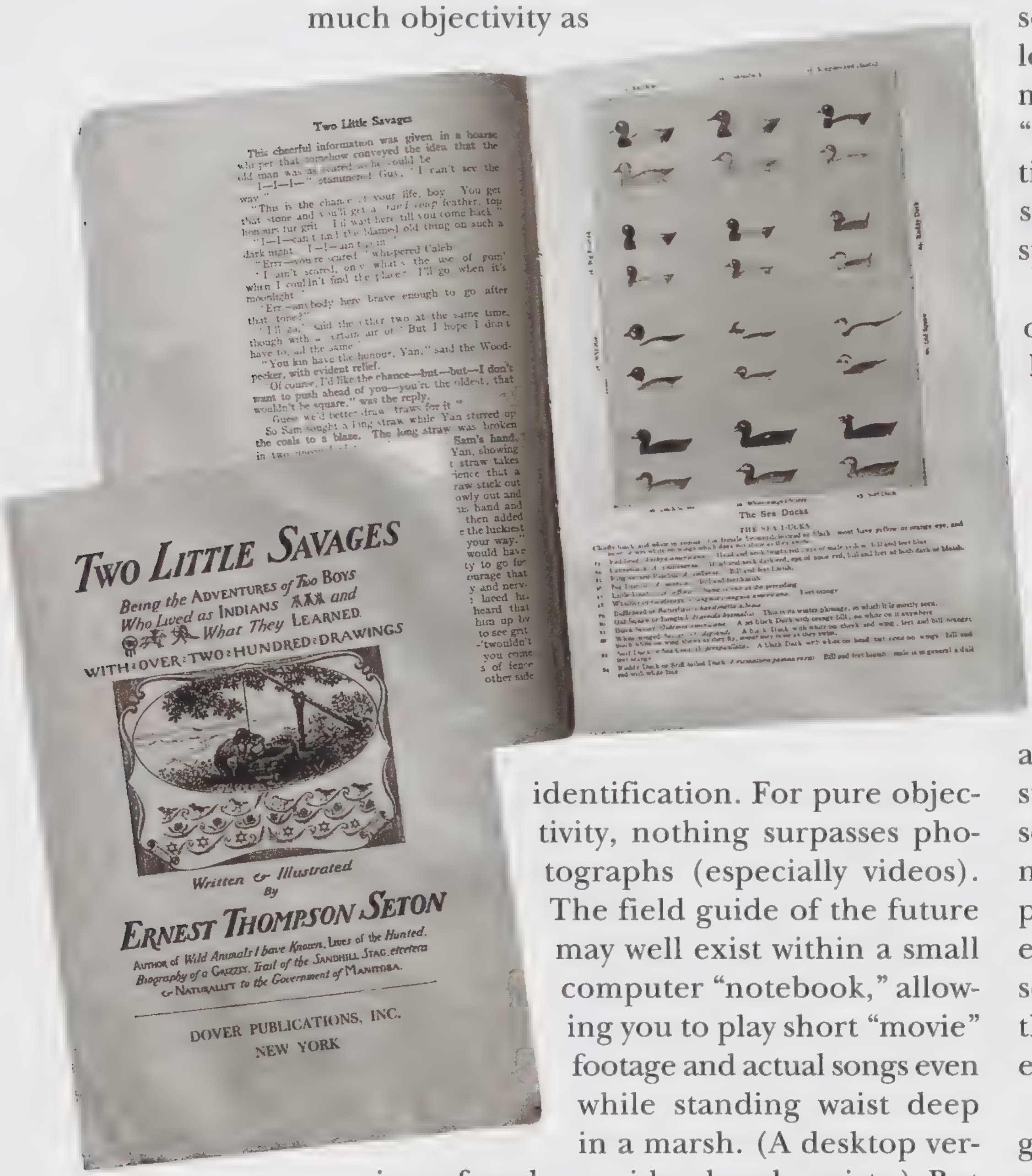
Of course, colors and shapes are static. Describing motion, behavior, and voice is inherently more complex, but Peterson succeeds here too. Dowitchers "feed with a sewing-machine

STEVE BENTSEN



motion," as their neighbor the Sanderling "chases the retreating waves like a clockwork toy." In the air, Belted Kingfishers fly "with uneven wingbeats (as if changing gear)," while the Cliff Swallow "ends each glide with a roller-coaster-like climb."

Clearly, these observations are all accurate and reasonably objective in their choice of similes. But the goal of a field guide is not so much objectivity as identification. For pure objectivity, nothing surpasses photographs (especially videos). The field guide of the future may well exist within a small computer "notebook," allowing you to play short "movie" footage and actual songs even while standing waist deep in a marsh. (A desktop version of such a guide already exists.) But even this hypothetical "hyper-text" field guide will surely include some static graphics and words like Peterson's. To identify something you have never seen, you must recognize it through specific observations (not merely match it up with a computer-driven likeness).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As a boy, Roger Tory Peterson read Ernest Thompson Seton's Two Little Savages *and identified with the novel's hero. The book was a major inspiraton to Peterson when he was developing his bird identification system. Far right, Roger relaxes in his studio with his wife, Virginia.*

Peterson is credited with essentially inventing the modern field guide. Through visual impressions, he initially groups similar organisms together, then emphasizes simple field marks that distinguish them. Before this innovation, field guides were generally dry and laborious dichotomous keys, often relying on bird-in-the-hand measurements and anatomical technicalities for distinctions. Interested but untrained amateurs had a difficult time before the "Peterson System" was created.

How did Peterson develop his system? He cites a novel that he read as a youngster as one of his major inspirations. Chapter XVI of Ernest Thompson Seton's *Two Little Savages* is titled "How Yan Knew the Ducks Afar." In it, Yan (the novel's hero) is frustrated by his inability to identify a duck in the distance. He looks in a bird book but it only tells about them "as if you had them in your hand." Realizing that "all the ducks are different; all have little dots and streaks that are their labels," he sets about making his own field guide. Yan locates a collection of stuffed and labeled specimens, then draws them as they would appear "afar." Seton includes two full-page illustrations of Yan's scheme, showing simplified "far-sketches" of both genders for a total of 24 species of ducks.

Peterson has acknowledged the importance of these pages in developing his system. In his hands, this new approach to field guides was so successful that, with a variety of expert authors, more than 40 such guides were eventually published, with subjects ranging from seashells to stars.

The general format of the system is perfectly reproduced by the following sentence structure, which appears (with minor variations) throughout the bird guides: "Recognized as [group name] by its ____; known as this species by ____." But Peterson does not stop with simple identification. To identify *with* something is probably the deeper goal for most nature observers, and to help them accomplish this, Peterson moves away from strict scientific objectivity, toward subjective, deeper-seated responses to what we see and hear in the field—into the realms of personality and emotion.

Accordingly, some distinctly unscientific language appears in Peterson's bird guides, yet it always fits its subject perfectly. Consider these examples: "pugnacious" (hummingbirds), "querulous" and "showy" (jays), "graceful" (terns), "acrobatic" and "peevish" (chickadees), "industrious" (Downy Woodpeckers), "rakish" (Red-breasted Mergansers), "stately" (Great Egrets), "dapper" (Northern Wheatears), "ghostly" (Barn Owls), "clownish" (Acorn Woodpeckers), "garrulous" (European Starlings) and "furtive" (Least Bitterns). He describes rails as "marsh birds of secretive habits and mysterious voices" with "brief and reluctant" flights, and the Lincoln's Sparrow as "a skulker, afraid of its own shadow." The Gray Catbird "flips (its) tail jauntily," in contrast with the Northern Pygmy-Owl, whose tail is "often held at a perky angle."

Ornithologists' phonetic representations of bird calls are often imaginative, to say the least. Although Peterson does list one or two accepted versions of what each bird "says," he usually also includes a more-helpful description of the *way* it is said. Sometimes he provides a simple description—a "liquid *peet* and a dry *chif-chif*" (White-winged Crossbill), "a gushing cadence of clear, curved notes tripping down the scale" (Canyon Wren), "a liquid twitter" (Tree Swallow)—while for other songs he uses similes—"like a soft, high-pitched bell or dripping of water" (Boreal Owl), "like two flint pebbles scraping" (White-rumped Sandpiper), and "like a tin horn" (Red-breasted Nuthatch).

But Peterson's most vivid descriptions of bird voices are those that allow a little emotion in. Who can forget a Common Loon's "falsetto wails, weird yodeling, [and] maniacal quavering laughter"? Or the Whip-poor-will's "rolling, tiresomely repeated *purple-rib*"? Or the Black-throated Green Warbler's "lisping dreamy *zoo zee zoo zoo zee*"? The Bell's Vireo "sings as if through clenched teeth," the Eastern Kingbird emits "a rapid sputtering of high bickering notes," while the Sage Thrasher sings "clear, ecstatic warbled phrases." The Rock Wren has "a harsh chant," Black-capped Vireo phrases are "remarkable for [their] restless, almost angry quality," and the Osprey makes "a series of sharp, annoyed whistles."

Purist ornithologists would call this anthropomorphism. Obviously, they are correct—but this doesn't make such descriptions any less useful or accurate. Indeed, the twentieth century has been marked by quantum and cosmic physicists alike having serious doubts about the objectivity of their observations. Perhaps biologists, whose domain lies between these two extremes, could take a hint from Peterson and start recording their *own* responses to stimuli.

Sometimes Peterson simply cannot contain himself. As though it would be helpful, he starts his description of the Painted Redstart with a single word: "Beautiful." It is for this bird's subfamily (the wood warblers) that he actually invents a word, "birdlets." (The meaning is obvious, but just try to look it up). Throughout the guides he makes liberal use of italics as *the typographic equivalent of arrows pointing to key field marks*; the result is the appearance of drama and import on every page.

This welling-over of enthusiasm does not detract from his guides; to the contrary, it is the very reason for their success. For in Peterson's case, success should not be defined by the number of books he has produced, nor the beautiful realism of the illustrations within them, nor the incisiveness of the words he uses (though he has certainly succeeded on all three counts). Rather, the greatest importance of the field guides has been that they have guided people back *to* the fields. They are, after all, where we came from; they are where we belong. We all owe him a great debt of gratitude. ■

When he's not birding or writing articles, Nathan Copple is a family practice doctor at a health center for low-income patients in Eureka, California.

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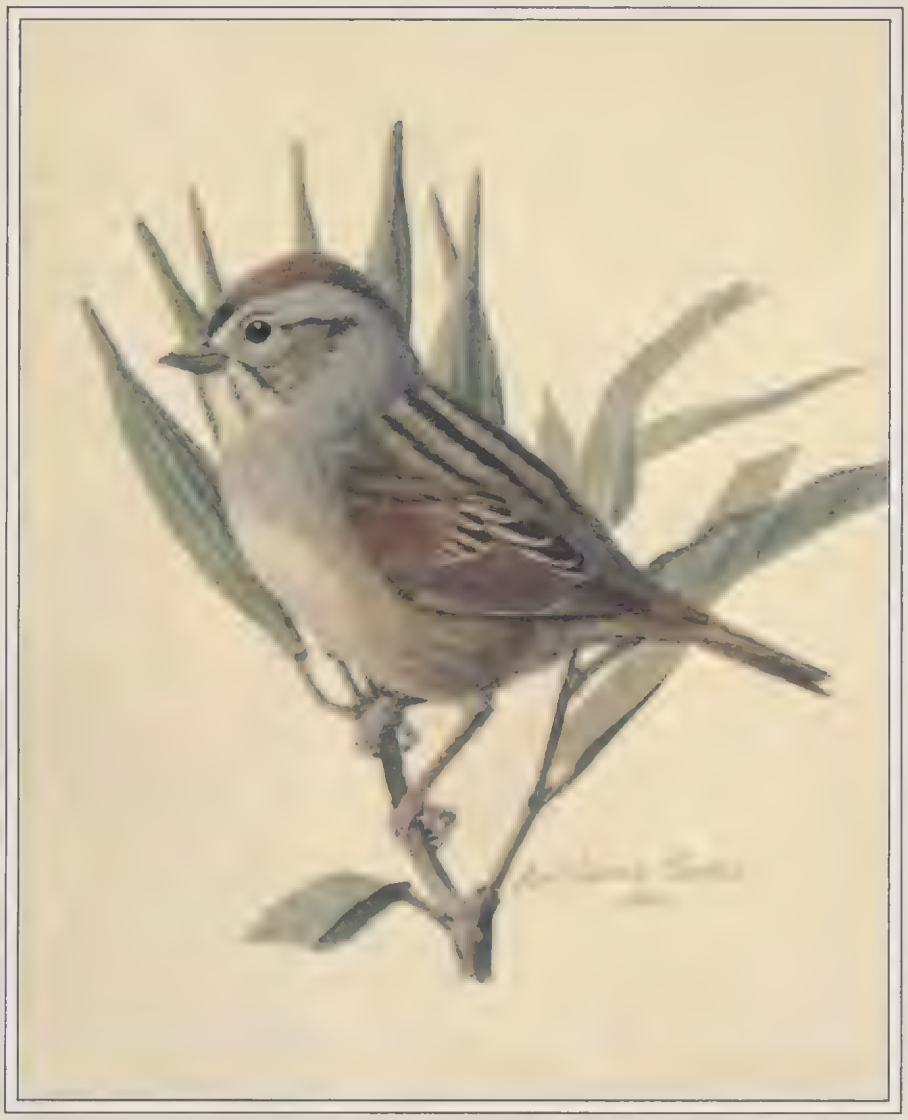

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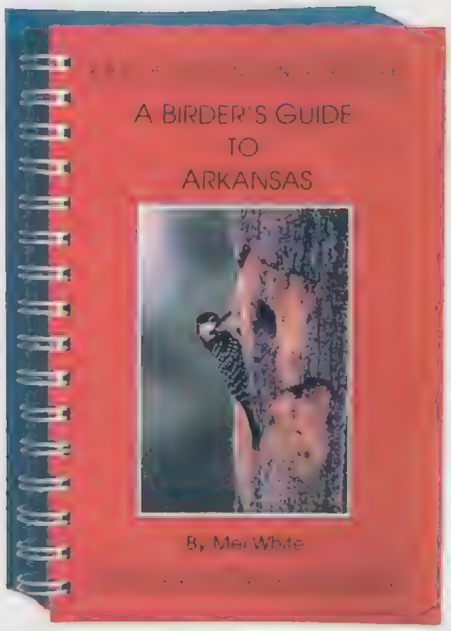

A BIRDER'S GUIDE TO ARKANSAS

by Mel White

Colorado Springs, Colorado: American Birding Association, Inc. 1995. Paper, 259 pages. $16.95

Arkansas, away from major population centers and landlocked to boot, is seldom visited by out-of-state birders. What a pity. Large (52,000 square miles) and lightly populated (2.4 million people) by eastern standards, the state offers a wonderful variety of natural habitats and birdlife.

Mel White's spiral-backed volume is the first comprehensive guide to birding in Arkansas. The guide includes an introduction, locality accounts, a seasonal checklist, appendices, references, and an index. The introduction briefly addresses geography and natural physiographic regions, with miscellaneous notes on weather, the seasons, and field precautions. The locality accounts, 59 in all, are organized by region: central (10); northeastern (9); northwestern (19); southwestern (7); and southeastern (14). A helpful state-wide locator map is presented on the fold-out back cover of the guide.

Each account wisely begins with summarized directions to the site. Small scale maps are provided for each locality. These are superb and have to be seen to be appreciated. Roughly a third of the accounts are accompanied by black-and-white photographs of habitat. Ink drawings of birds scattered among the accounts range from passable to excellent, but the space may have been better utilized by offering a few more birding localities.

The author's writing style is light and informative, offering historical tidbits and local color with a humorous touch. Descriptions and bird lists are accurate for localities that I have birded. White concentrates on regularly occurring species but mentions rarities as well. I was pleased to see the attention given to common (in Arkansas) species—after all, they constitute 99.9 percent of individuals observed, and they are the ones that most out-of-state visitors will be looking for.

Most of the sites covered lie in the Arkansas River Valley and the Ozarks. The cluster of sites around Fayetteville reflects the location of the University of Arkansas as much as anything—good birding locations are found in every stream drainage in the Ozarks. If space permits, future editions of this guide should strive to incorporate more sites in southern and northeastern regions of the state. In fact, there are good birding locations in each of the state's 75 counties (even largely deforested Mississippi County).

The American Birding Association's code of ethics is prominently displayed at the front of the book, and White repeats his admonition about harassing Red-cockaded Woodpeckers in several accounts. In general, harassment of birds in Arkansas by birders is rare, primarily because there are so few birders in the state. Nevertheless, as this woodpecker continues to decline, birding pressure on publicized nesting clans will increase. I suspect that the only species at present bothered on a regular basis by birders in Arkansas is the Rufous-crowned Sparrow. A few pairs nest in rocky glades on Pinnacle Mountain, Mt. Nebo, and Mt. Magazine. I have mixed feelings about publicizing the locations of both of these species in a bird-finding guide.

White concludes the guide with annotated notes on "specialties," an index, and bar graphs of seasonal occurrences of birds in the state. A nice addition is the appendix listing mammals, reptiles, amphibians, and butterflies recorded in Arkansas, including their scientific names. All in all, White has done an admirable job of capturing the flavor of dozens of Arkansas' best birding spots.

Finally, the first-order principle of birding is the aesthetic appreciation of nature. The context in which we observe and study birds matters to us. The deepest satisfaction comes when we immerse ourselves in natural habitats that are little altered by humans—or at least out of earshot of internal combustion engines. Solitude has become a precious commodity and more and more birders are seeking quiet venues that offer high-quality natural experiences instead of focusing on "hotlines," listing, and chasing rarities. If the aforementioned philosophy resonates with you, then mark Arkansas high on your list and take along a copy of Mel White's fine guide.

—Gary R. Graves, Division of Birds, National Museum of Natural History, Smithsonian Institution

In the Field

OSPREYS ON THE PARKWAY

by Jack Connor

Learning to stand still and appreciate the birds right in front of you

It's a nest easy to see and easy to ignore.

As you cross the Mullica River marshes in the southbound lane of the Garden State Parkway, look below the power line tower on the right—near milepost 49. The tilting telephone pole on the north side of the river, 70 yards from the most heavily traveled road in South Jersey, has held a pair of Ospreys and their young for the last dozen summers.

I use it each spring in my "Biology of Birds" course as an example of the precision of migration timing, telling my students on March 13 or 14, "Start checking as you go by. The Ospreys will be back on it in one week."

The birds make me look good each year, arriving without fail on March 19, 20, or 21. Homecoming day last year was March 20, the vernal equinox. "They're both there," said the first student to see them, "standing on the platform like they own it."

The following weekend I drove over for a look. To study the birds, you must drive to the end of the abandoned road that parallels the highway on the south side of the river, then walk the sandy path around and under the bridge to watch the nest across the water. It's an unattractive place at first impression. The Parkway cars rumble ceaselessly overhead; tires, Styrofoam, and beer cans litter the path. Graffiti, fire pits, and abandoned underwear suggest the bridge hosts a night life most birders avoid.

The wind, funneled by the concrete bridge structure, blows hard and cold, and that afternoon the marshes had an empty, midwinter feel; the only creature in sight was the male Osprey quietly refurbishing. He swooped into the dead grasses below the pole, grabbed a reed with his talons, and dropped it into the nest. The female was off hunting, apparently, building her reserves for her upcoming long sit, and I didn't have the time to wait for her. At Brigantine Refuge, five miles away, flocks of northbound ducks and geese were migrating, and the first shorebirds were due back.

As I drove away, I resolved to keep a better watch at the nest than I had in past seasons, promising myself to visit regularly and to monitor the pair's progress. As it turned out—as it always seems to turn out—I depended instead on the reports of my commuting students, who zoomed by the nest each morning at 60 mph.

"I saw them copulating," a student reported April 1.

"She must be on eggs," another reported about April 10. "She's squatting in the nest by herself, not moving."

"Neither of them ever seems to do anything," someone said near the end of April. "Whenever I drive by, the male is sitting in the tower and the female is sitting on the nest."

"Shouldn't they have young by now? a student asked me in late May. "Did something go wrong?"

On June 6, one of my regular reporters walked into class with a distressed look on her face. "The nest failed. Two black crows have taken it over."

I went out to the bridge that afternoon, my first visit in three months. The marshes had become a different place. The sedges and grasses were green and lush. Small black-and-yellow dragonflies—seaside dragonlets—hovered over the sand, chasing prey and each other; male fiddler crabs waved their claws from the front of their burrows. Marsh Wrens and Seaside Sparrows sang; Willets called; swallows circled and chipped. Best of all, the two "black crows" were two young Ospreys, sitting side by side in the nest and being fed a fish by their mother.

Those of you who share my birder's paranoia—that the good birds are always elsewhere, that no matter where you are at the moment and what birds you are watching, you ought to be hurrying away to someplace else to search for different birds—know how hard it can be to stand still anywhere. The false alarm had suppressed my neurotic anxiety for once, however, and I sat down, determined to appreciate these hawks for one afternoon.

The female worked at the fish steadily and quickly, ripping 15 or 16 pieces a minute into fingernail-sized strips which she held out for her young to take from her bill. Perhaps one piece in 20 she swallowed herself. When a nestling missed a bite, she leaned closer to give it another chance. Once a nestling missed the same piece three times in a row. She swallowed that piece, tore another, and held it out. The nestling gobbled it down first try.

When a third adult Osprey flew overhead, she mantled her young and the fish, and screamed: *chi-urp! chi-urp! chi-urp!* The intruder circled around on another pass and two others joined it, all three soaring high above the nest. The female continued screaming; her young flattened themselves beneath her; finally her mate left his perch on the tower to fly up to them. He seemed less distressed than she, flying with the group like a bar bouncer mingling with the crowd, then lowering his talons ever so slightly, like the bouncer folding his shirt-sleeves to reveal his forearms. The intruders sailed away.

The thumping at my feet was a diamond-backed terrapin knocking against the bunker I'd been sitting on. She had come up to lay her eggs and was making her way back to the river. By the time she splashed into the water the female Osprey was feeding her young again—quickly, intently, carefully.

Suddenly the graffiti, the Styrofoam, and the birds I could have been watching elsewhere didn't seem so important—and the hard wind of March was a cooling breeze in June.

Over the next month, I visited the site a dozen times and discovered that Alan Poole's wonderfully detailed *Ospreys: A Natural & Unnatural History* helped me make sense of what I was seeing.

C. ALLAN MORGAN

"The tilting telephone pole, 70 yards from the most heavily traveled road in South Jersey, has held a pair of Ospreys and their young for the last dozen summers."

"There is a bit of pack rat in every Osprey," Poole writes. "Anthropologists would enjoy looking through [their] nests for the refuse of local human cultures." The Parkway nest contained a yellow Frisbee, a plastic pirate sword, and something that looked like half a wind sock. On my third or fourth visit I realized the green shrubbery in the corner of the nest was not a windblown branch; it was a living bush growing out of the nest 40 feet in the air.

Sibling rivalry is common, Poole notes. "[The] dominant chick, usually the oldest and largest in the brood, reacts instantly when food is brought to the nest . . . viciously pecking [the subordinate's] head and back . . . the loser then waits until the dominant chick has fed." The white-naped nestling was clearly dominant in the Parkway nest, jumping forward to grab fish from the female and mantling it from the golden-hackled nestling. When the female let them feed themselves, Golden generally alternated preening and begging from a corner of the nest while Whitey tore at the fish, opening its bill and snapping when Golden came too close. Golden coped by creeping up to steal bits and pieces after Whitey had shredded the prey into sections and by begging more persistently from the female.

On July 11, it was Golden who seemed closer to flying. Both nestlings had been flapping their wings for weeks. "As their proficiency develops," Poole observes, "nestlings face the wind and jump repeatedly, wings pumping, legs dangling, and wild-eyed. Eventually, a puff of wind will catch one, dropping it over the lip of the nest and forcing its first flight." While Whitey flapped up a few inches, Golden elevated several times 5 or 6 feet off the nest, straight up. That over-the-top puff didn't come, though, and eventually the nestlings settled down.

On July 14 the nest was empty for the first time since the tenth of April, 95 days earlier. The young had flown. Golden stood on the tower next to its father; Whitey swayed on the telephone line leading from the nest, head weaving back and forth like an owl's, studying the river below.

The female arrived with a flounder in her talons, landed at the nest, mantled the prey, and screamed: *chi-urp! chi-urp! chi-urp!* Her family ignored her. She flew to the tower, chased her mate away with a snapping bill, and fed Golden with her usual intensity. Meanwhile Whitey circled out from the line and over the river three times, wings flapping heavily, head down, eyes on the water below, which was dark, deep, and churning. The tide was going out.

It's a family tableau I have tried to fix in my mind, because all four hawks departed soon after. Odds are the adults will be back this March, right on schedule. They'll remember the river, their nest, and the success they have had there. It's the psyche and distractions of the human observer involved that leads to the tougher question: Will I remember what a thrill it is to watch them? ■

THE PRICE OF RESPECTABILITY

by Pete Dunne

He was wearing a leprous white Panama hat, lizard-skin shoes, and a platinum-colored suit that glistened like a shark in a sauna. The limousine he stepped from was the color of a cherub's bottom and the size of a luxury liner.

It's the fifty-pound, sterling-silver swan on the hood that makes it, I thought. But that was before I noticed the light bulb-rimmed vanity plate that read: JOHN.

While the gas station attendant rushed to "fill it up," one of the planet's seamiest denizens began eye-balling my car and phonetically decoded the legend emblazoned across the hood that read NEW JERSEY AUDUBON SOCIETY. Fixing what I read to be a patronizing smile upon me, the man strutted to my open window, pointed to the New Jersey Audubon logo, and said more than asked, "You one of those *bird* watchers?"

At last! I thought nostalgically. A member of society who wants to demean me. It's been a long time since anyone has been disparaging about my avocation and frankly I miss my old social misfit standing.

Half a decade ago bird watching was an interest you hid. If you were a kid, it wasn't cool, was certain to get you picked last when they divvied up sides for sandlot baseball. If you were an adult, it made you tantamount to a commie sympathizer, and might even land you in jail (particularly if you espoused a liking for Prothonotary Warblers).

I can remember my parents discussing my unnatural attraction to birds and wondering how to replace the binoculars in my hands with something more socially acceptable—like a baseball bat. I can remember telling a guidance counselor that I liked watching birds and being called back for extra sessions.

Even after I grew up, went to college, and started working for New Jersey Audubon, I *still* couldn't earn the social acceptance accorded your average mass murderer. When family and friends would ask my brothers what I was doing, they'd mumble something inaudible and change the subject. One poignant evening I described all the neat bird-related stuff I was engaged in to my sainted grandmother, only to be treated to her admonishment: "You should have stayed in the carpet business, you'd be making good money now."

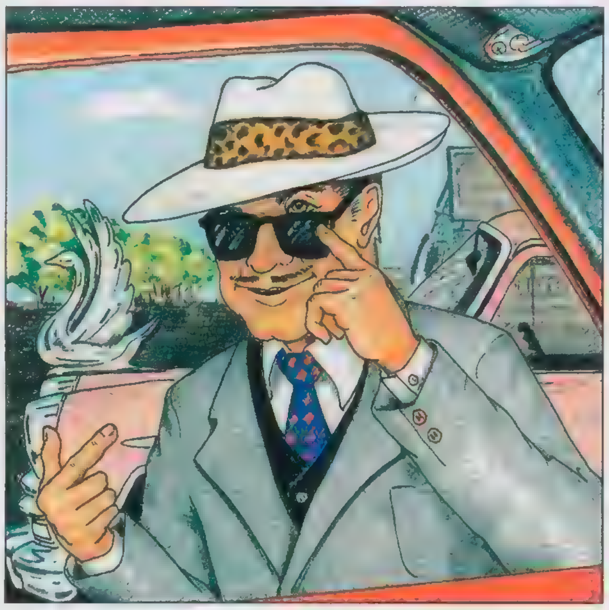

ILLUSTRATION BY JEFF SIPPLE

There was a stigma associated with being a bird watcher that divided the world up between us (birders) and them (society's rank and file). Birding made you an outcast, a renegade. Over time, not only did I come to accept a measure of social severance, I grew to like it.

Heck, I concluded, if everybody liked watching birds there'd be gridlock on the refuge auto routes and standing room only on the hawk watch.

But that's all changed now. Suddenly everybody's into birding and everybody wants to know about it. When the Whiskered Tern set down in Cape May, network newscasters were calling and begging for interviews. Now that it has become established that birders are an economic force, optics manufacturers are pleading for marketing tips and every whistle-stop chamber of commerce is planning a birding festival.

Whenever I drive somewhere in the company car, people wave, flash membership cards in assorted environmental organizations, and stop me to ask how to attract hummingbirds. Worried parents ask me how to get the video joysticks out of their kids' hands and replace them with binoculars.

Suddenly, I'm not an outcast anymore. I'm a personality, an oracle, an avenue to spiritual enlightenment and economic development. Now everyone wants to tell me about the House Finch nesting over their hot tub or the product they developed to keep squirrels off feeders.

Suddenly, after a lifetime of being a social outcast, I'm normal. And I can't stand it. I feel like Dostoyevsky without his guilt, Ahab without his whalebone leg, Richard III without his hump. That is why I greeted JOHN's approach so gleefully. Here, I felt certain, was a man who could give me back my hump.

"Why yes," I assured the lizard-shod gentleman. "I'm a birder."

"Oh, man, that's wonderful," he said destroying all hope for a testy exchange. "I got a question for you. See, I love birds. And every morning I go to this parking lot to feed the seagulls. Whenever my car pulls into the lot the birds just crowd around me. Now, what I want to know is do you think they really recognize me or what?"

"Sir," I said, taking in both the figure and the car, "I'm confident that they recognize you."

"Oh, that's wonderful," he said. "Does your organization accept contributions?"

I should have stayed in carpet, I thought. ■

CYNTHIA BERGER

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LIVING BIRD

SPRING 1996 VOLUME 15 NUMBER 2

GREETINGS FROM SAPSUCKER WOODS

It's been a harsh winter at Sapsucker Woods—long months of deep snow and frigid weather, punctuated by a brief warm spell in January that brought massive flooding to this part of New York before the deep freeze returned. But now we seem to be moving finally into spring. Walking through the woods I see tiny leaves beginning to emerge from the branches overhead.

Soon Sapsucker Woods will explode in lush green foliage, and the spring migrants will arrive in force—large flocks of Yellow-rumped Warblers early in the season; a pair of American Redstarts near the first bend in the trail; Black-throated Green Warblers in the deep woods at the back of the sanctuary; Northern Orioles nesting over the parking lot; and the stunning Scarlet Tanagers near the Severinghaus Trail—filling the warming air with their songs.

It's something that happens every spring, as certain as paying taxes, and yet the arrival of these tiny, colorful migrants never ceases to thrill me. The promise of their return is enough to keep most of us at the Lab going through the bleakest days of winter. We know that no matter how bad the weather seems now, in a few weeks we'll be taking our morning walks through Sapsucker Woods wearing T-shirts, watching and listening intently, and hoping to be the first to spot each migrant species as the birds return from their faraway wintering grounds.

Still, I can't help wondering whether we'll always be able to count on these birds to brighten up our lives. Many migrant songbird species are seriously threatened by habitat destruction and other insidious environmental threats. It's up to all of us to work together and ensure that Rachel Carson's grim prophesy of an upcoming "silent spring" will never come to pass.

— Tim Gallagher
Editor-in-Chief

Cover: Even a stately adult Great Blue Heron has a hard time looking elegant when faced with a hungry brood of gawky nestlings. Photograph by Cliff Beittel.

Right: Swedish artist Stefan Hansson's lifelike portrait of an Eagle Owl is one of the many stunning paintings and sculptures on display at the current "Birds in Art" exhibition. Read more about this world-renowned annual art show on page 30.

Back Cover: An American Bittern strikes a characteristic pose, trying to look like just another plant stalk in a field. Photograph by Cliff Beittel.

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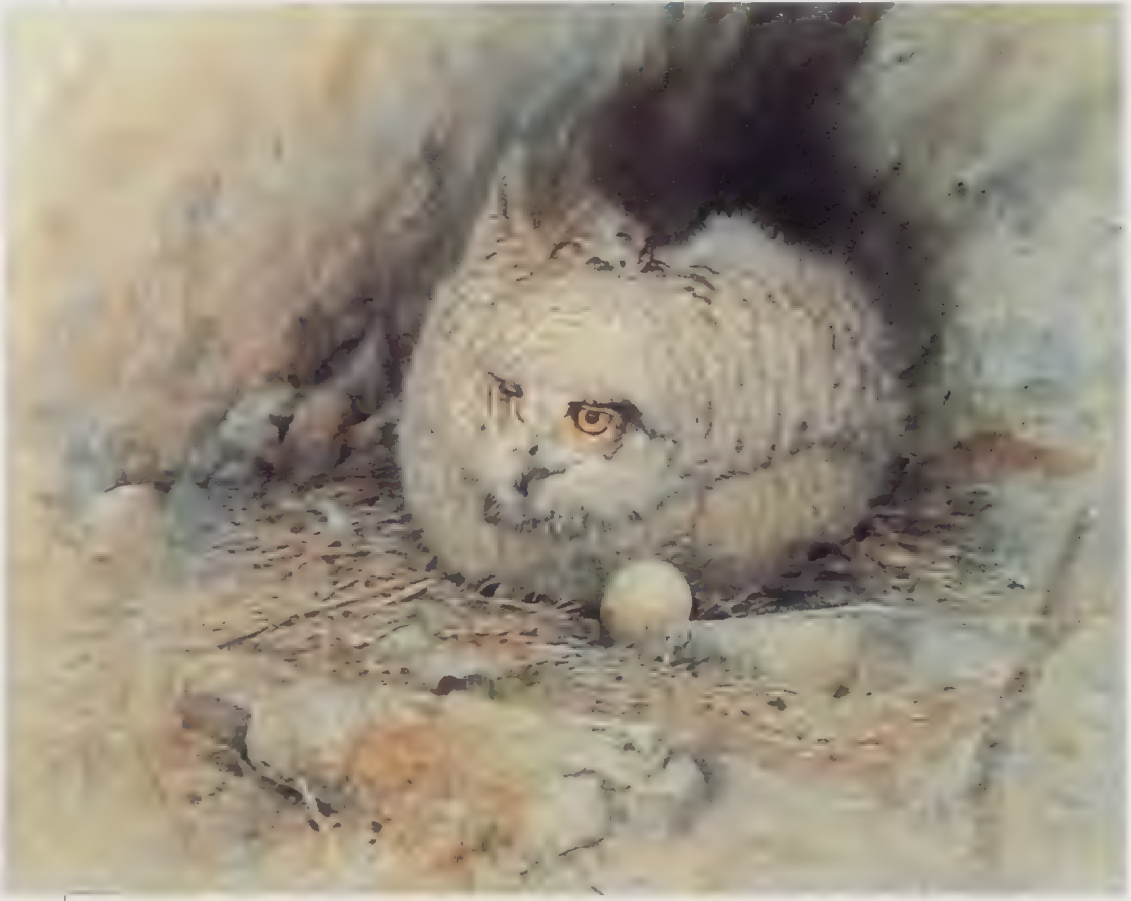

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Letters

ERWIN AND PEGGY BAUER

TOP GUN UPDATE

I want to let your readers know that just a few months ago, the Harpy Eagle that David Wilcove wrote about in "Top Gun" ("Spotlight," Autumn 1995) was shot and eaten by a local hunter. The farmer was arrested for gunning down the eagle but was released after eight days in jail.

I am the Venezuelan graduate student who placed a satellite tag on that Harpy Eagle; my sponsoring organization is The Peregrine Fund.

We banded this eagle in March 1993 and tagged it with an ARGOS satellite transmitter provided by NASA and the U.S. Biological Service. We gave it the code name SARA.

SARA remained close to its nesting area for the next two years. Not until March 1995 did we receive a satellite fix that was some distance away (18 kilometers west of the nest). In July, 27 months after we tagged this eagle, SARA was shot and eaten some 10 kilometers southwest of the nest where it hatched.

The good news is that SARA's parents are now raising a new eaglet. To date The Peregrine Fund has tagged nine young Harpy Eagles in Panama and Venezuela and, with the help of local people, we are monitoring more than 20 nests.

Also, the factors that Wilcove cites as responsible for the rarity of Harpy Eagles are not supported by our data. He says the birds have immense home ranges and don't occur in areas occupied by Crested Eagles, yet our research focused on a group of six nests within an area of only 10 by 30 kilometers, and we have seen two different Crested Eagles inside this area. Wilcove also says that the harpy requires pristine rainforests, but we find that nests continue to be used during and after selective logging that sometimes involves heavy machinery.

Wilcove has bravely tackled an important issue that usually goes unmentioned—the role of ecotourism in bird conservation. Many bird watchers feel disappointed when they realize that someone has been handling the rare bird they came to enjoy. Yet so far ecotourism has done little toward the conservation of these birds. We encourage visitors to share their observations; key monitoring data could be enhanced by the contributions of bird watchers.

Eduardo Alvarez-Cordero
Panamerican Coordinator
Harpy Eagle Conservation Program
Gainesville, Florida

A TREAT FOR THE EYES

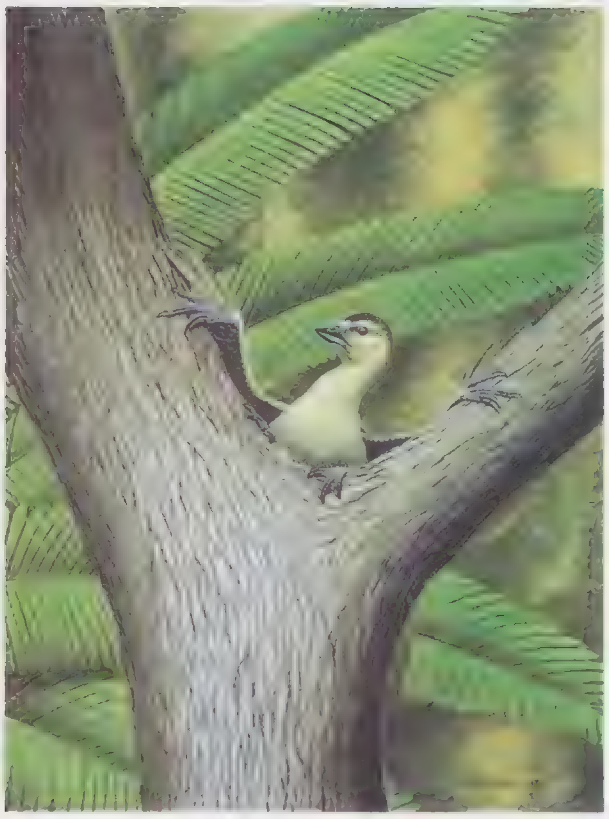
When the Autumn 1995 issue of *Living Bird* arrived a couple of weeks ago I vowed I would write and express my appreciation of the magazine—especially the marvelous photograph of an American Kestrel on the cover.

Now I have received the material from Project FeederWatch, and again the Lab has outdone itself. The pictures by Louis Agassiz Fuertes add much to the instruction booklet. They make it a joy to use, and a treasure to keep. My thanks to the whole Lab.

Barbara James
New Orleans, Louisiana

We welcome letters from readers. Address letters to: The Editors, *Living Bird*, 159 Sapsucker Woods Road, Ithaca, New York 14850.

BirdNews



PAINTING BY JOHN O'NEILL, FROM *THE ORIGIN AND EVOLUTION OF BIRDS*, BY ALAN FEDUCCIA. NEW HAVEN: YALE UNIVERSITY PRESS; 1996.

A Rare Old Bird

Recently, a farmer picked up some odd rocks in the Liaoning Province of northeastern China. Scientists at the Chinese Academy of Sciences recognized the fossil bones as a fabulous find—a new species *(Nature,* vol. 377, pp. 616-618; 1995) that now shares the title of "most ancient bird" with the famous *Archaeopteryx.*

The beaked creature, about the size of a bantam rooster, has been named *Confusciusornis sanctus,* or "Holy Confucius Bird," after the renowned Chinese philosopher. It is the first Jurassic-era bird discovered outside Germany—and thus provides the first evidence that birdlike animals existed in more than one location at that time (about 147 million years ago).

Bone for bone, the Chinese bird and *Archaeopteryx* show many similarities, including long finger bones that end in strongly curved claws—useful for climbing trees. But the Chinese bird has a horny, toothless beak, a radical advance over the toothy jaws of *Archaeopteryx.*

"I was shocked when I saw this specimen," says Alan Feduccia of the University of North Carolina, who helped describe the new species. "It looks like *Archaeopteryx* in so many ways, yet it has this nice beak. You don't find any other beaked bird in the fossil record for another 60 to 70 million years."

The bones of *Confusciusornis* are preserved in petrified mud that reveals it lived in a lush forest on the shores of a freshwater lake. The mud also preserved the imprint of contour feathers—evidence that this bird's body was covered with an insulating feather cloak. *Archaeopteryx* fossils show the imprint of flight feathers, but not contour feathers.

Take Cover

A classic bit of advice for people who feed birds is, "Place your feeder close to protective cover—a dense bush, or an evergreen tree." The idea is that birds can flit to safety if predators threaten.

Like many maxims, this one made intuitive sense but hadn't really been backed up by scientific testing. Recently, scientists at the Institute of Terrestrial Ecology in the United Kingdom decided to get some hard data—right in their own backyard (*Ibis,* vol. 137, pp. 418-428; 1995).

They compared bird visits and predation events at two feeders outside institute headquarters. The "safe" feeder was only 6 meters from a dense (and prickly) hawthorn bush; the "dangerous" feeder was almost 50 meters from the nearest cover. Great Tits and Blue Tits were common feeder visitors, while Sparrowhawks often cruised the area looking for a quick meal.

The raptors did indeed attack birds at the dangerous feeder more often than at the safe feeder—and with more frequent success. The scientists also noticed that the safe feeder hosted a higher proportion of adult tits than the risky one, suggesting that adults were dominating the juvenile birds and hogging the most secure feeding site.

In sum, the feeder placement axiom stands up to scientific testing. This study also shows that key discoveries can be as close as your own backyard.

Married to the Mob?

Every mother wants the best for her children. Great Spotted Cuckoos are no exception: although they don't expend any effort rearing their young, they search out good adoptive parents, according to a recent Spanish study *(Behavioral Ecology and Sociobiology,* vol. 36, pp. 201-206; 1995). Before you applaud the cuckoo's tender maternal sentiments, though, consider that a related study shows these birds use the threatening tactics of an underworld "enforcer" to ensure good care for their young (*Evolution,* vol. 49, pp. 770-775; 1995).

Great Spotted Cuckoos lay their eggs in the conspicuous, domed nests built by Black-billed Magpies. The researchers noticed that cuckoos tend to parasitize the largest nests, and wondered whether "big nest" equals "good parents." In a clever manipulation, they added cuckoo eggs to magpie nests that had escaped parasitism, then compared these nests to naturally parasitized nests. More birds fledged from nests the cuckoos selected themselves than from nests the scientists selected—suggesting the cuckoos had chosen wisely.

According to the researchers, magpies who resisted the cuckoos by ejecting the alien eggs were subjected to violent "sanctions"—the destruction of their own eggs or nestlings. They usually responded to this disaster by laying more eggs. But they weren't indifferent to the threat. After destroying the first clutch, the female cuckoo usually returned to add her own contribution to the second clutch, and this time, the magpies let the cuckoo eggs lie. Apparently they realized that resisting crime doesn't pay.

COMPILED BY CYNTHIA BERGER

PRAIRIE HOME COMPANIONS

by David Wilcove

The Upland Sandpiper is perfectly at home in Norman Rockwell's America

The Bald Eagle may be our nation's symbol, but you can spend a lot of time in the Great Plains without seeing one. What you will see is the Upland Sandpiper, and a more fitting symbol of rural America is hard to imagine. Its graceful contour, haunting voice, and rich, earth-tone colors make it a perfect match for the open skies, pastures, and prairies of the midwestern and central states. When I look at *American Gothic*—Grant Wood's much-parodied but unforgettable painting of a dour farm couple with a pitchfork—I imagine an Upland Sandpiper in the background, perched atop a fence post, its wings raised above its back in the classic Upland Sandpiper "salute."

Like the family farmer, the Upland Sandpiper has become a vanishing icon in many parts of the country. In states such as Illinois, where it once was common, the species is now considered endangered. Sad to say, the Upland Sandpiper has plenty of company. According to the National Biological Service, over the past quarter-century, grassland birds have experienced steeper, more consistent, and more widespread declines than any other group of North American birds.

Given what we've done to the grasslands, none of this should come as much of a surprise. For more than a century and a half, the citizens of the United States have been busily converting grasslands into row crops and pasture. Hardly an acre has been spared the plow or the cow. In the Great Plains, for example—a region of roughly half a billion acres—less than one percent of the original grasslands remains undisturbed by human activities. Yet the connection between these activities and the disappearance of the grassland birds is more complicated than you might expect.

Grassland birds vary considerably in their willingness to live in nonnative vegetation. Some, such as Horned Larks and Chestnut-collared Longspurs, readily nest in croplands, provided the crops bear some physical resemblance to the native grasses. Prairie-chickens tend to be fussier, preferring bona fide native prairies. Grassland birds also show varying degrees of sensitivity to the sizes of the grassland patches. Some species are found only in the largest pastures and prairies, whereas others can survive in small, isolated fragments. Most important, grassland birds are keenly sensitive to the pattern of disturbance within their habitats. Historically, North America's grasslands were maintained by fire; without it, woody shrubs crowd out the native grasses. A number of grassland birds show a strong preference for recently burned sites, where the vegetation is short and simple, whereas others prefer the tall vegetation in grasslands that have not burned for several years.

How does the Upland Sandpiper fit into this picture? It is hardly a purist when it comes to its choice of habitats, nesting not only in native prairies, but also in pastures, hayfields, and even airports—any habitat that provides a significant amount of short grass. On the other hand, sandpiper pairs maintain large territories (perhaps 50 acres or more), making them vulnerable to habitat fragmentation. A pasture capable of supporting many pairs of Savannah Sparrows may be too small for even a single pair of sandpipers. Finally, the Upland Sandpiper needs short grass. In the presettlement era, it probably flourished in areas that had been recently burned or intensively grazed by bison. More recently, it has depended upon combines and cows to provide the short hayfields and pastures it prefers.

Thus the Upland Sandpiper, unlike such endangered species as the Ivory-billed Woodpecker or California Condor, can easily coexist with people. It doesn't require old-growth forests or wilderness or even native vegetation—it is perfectly at home in Norman Rockwell's America. The ironic problem is that Rockwell's America is being supplanted by industrial agriculture and suburban sprawl. What has harmed the Upland Sandpiper has been the conversion of prairies, hayfields, and pastures into corn and soybeans, the advent of "clean" agriculture that leaves no buffer strips for birds and other wildlife, the loss of open space due to urban encroachment, the regeneration of forests (especially in the Northeast), and the practice of mowing fields before the chicks have fledged.

The Upland Sandpiper probably will not disappear anytime soon. It has an enormous range, stretching across the eastern and Great Plains states, through the Prairie Provinces of Canada, and deep into Alaska. But I am less sanguine about some of the other grassland birds. The Mountain Plover, for example, is another devotee of very short grass, and its populations have been declining by an average of 3.6 percent per year since the mid-1960s. No one is sure why. The Henslow's

Sparrow, on the other hand, prefers fields that have not burned for several years and have accumulated tall vegetation, numerous dead grass stems, and abundant dead plant material on the ground. It has been declining by more than 4 percent per year, according to data from the Breeding Bird Survey. Like the Upland Sandpiper, it appears to be quite sensitive to the size of its habitat, inhabiting only the largest patches of grassland. Both the Mountain Plover and Henslow's Sparrow have much smaller breeding ranges than the Upland Sandpiper, making their declines all the more serious.

Adding to the problem is the lack of data on the wintering ecology of these birds—somewhat understandable in the case of the Upland Sandpiper, which winters in the grasslands of Argentina and Brazil, but inexcusable in the case of the Henslow's Sparrow, which winters within our own southeastern states. Bird watchers who have the opportunity to study these birds during the winter can make a valuable and timely contribution to their conservation.

The most obvious way to protect grassland birds is to protect grasslands, especially the remaining native prairies. This has long been a goal of private land trusts and conservation organizations such as The Nature Conservancy. Once protected, however, grasslands must be managed, and here complications arise. Because different birds require different disturbance regimes, no single acre can be simultaneously suitable for a complete array of grassland birds, from Upland Sandpipers to Henslow's Sparrows. James Herkert, a scientist with the Illinois Endangered Species Protection Board, recommends that owners of large prairies burn sections on a regular rotation to provide a range of habitats and sustain a diversity of grassland birds.

Where the original prairie has long since fallen victim to the plow, some of the biggest gains for grassland birds have come from an unlikely source: agricultural subsidies. Although designed to benefit agricultural industries, federal subsidy programs have been broadened in a few cases to include conservation benefits. The 1985 Farm Bill, for example, featured the Conservation Reserve Program (CRP), under which farmers were paid to plant perennial cover on highly erodible lands and to leave this land fallow for a 10-year contract period. About 35 million acres of marginal farmland have been enrolled in the CRP program, and according to a recent study by scientists from the National Biological Service, these CRP lands are a lifeboat for many grassland birds. Lark Buntings, Grasshopper Sparrows, and other declining species were more than 10 times as common on CRP lands as they were on adjacent cropland.

Unfortunately, the U.S. Congress seems to be determined to scale back the Conservation Reserve Program and encourage farmers to bring many of these marginal acres back into production. Some fine-tuning of the CRP is undoubtedly needed (especially in this era of deficits), but on the whole it is surely one of the federal government's better investments. What other program prevents soil erosion while providing Americans with more meadowlarks, Bobolinks, and Upland Sandpipers? It's enough to bring a smile to the face of Grant Wood's farmer. ■

CLIFF BEITTEL

Like the family farmer, the Upland Sandpiper has become a vanishing icon in many parts of the country.

Suggested Reading

Herkert, J. R. Breeding bird communities of midwestern prairie fragments: The effects of prescribed burning and habitat area. *Natural Areas Journal,* vol. 14, pp. 128-135; 1994.

LaRoe, E. T., G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, eds. *Our Living Resources. A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems.* Washington, D.C.: USDI National Biological Service, 1995.

My Turn

CLIFF BEITTEL

How do you react when you see a Brown-headed Cowbird? Many bird watchers see red whenever they spot this small, drab blackbird, whose habit of laying eggs in other birds' nests is causing population declines in some songbird species. But before we declare all-out war on the cowbird, it would behoove us to take a look at the facts—and the philosophy—behind cowbird control. Here are two essays on the cowbird question, one from a bird watcher, and one from a scientist. Let us know what you think.

COWBIRDS AREN'T EVIL

by Marlene A. Condon

Enjoy them for what they are—unique creatures, doing their best to survive

When I was the editor of my local bird club newsletter, a reader once asked me how to discourage Brown-headed Cowbirds from coming to feeders. I answered the question in the newsletter. In my experience, these birds prefer white millet to sunflower seeds, so I recommended either feeding sunflower seeds exclusively or withholding all seeds for several days until the cowbirds dispersed.

I went on to say that, personally, I do not get upset if I see cowbirds around. As a naturalist, I am fascinated by their survival strategy. The cowbirds' means of reproducing—laying eggs in the nests of other bird species—was perfectly suited for their nomadic lives on the western prairies. The fact that this reproductive strategy creates problems in the East, where cowbirds are relative newcomers, does not make these creatures *evil.* Yet that is how most birders regard cowbirds, charging that they are responsible for declines in some of our songbird populations.

I care as much as anybody about declining songbird populations. Yet I can't blame the cowbirds at my feeders for doing what comes naturally. I enjoy the sounds they make, and I consider the males, with their shiny plumage, quite attractive. I do not try to attract these birds to my yard, however. I ended my reply by saying that we should minimize our assistance to cowbirds to help control their populations, but we could still enjoy them for what they are: unique creatures, doing their best to survive.

I was astounded by the reactions to my editorial. One birder in my area stopped speaking to me. Another told me my comments were totally irresponsible. Finally, I heard that I was being described as a controversial writer.

People who love birds tend to hate anything that is a bird's enemy—not just cowbirds but raccoons, cats, and snakes. I know some people who kill cowbirds illegally (as a native species of the United States, cowbirds are protected). Should birders feel this much animosity toward cowbirds? Like jealous lovers, are we incapable of being realistic about the situation that has developed?

It helps to understand cowbird breeding dynamics. For the most part cowbirds parasitize species that are common and widespread. Red-winged Blackbirds are one example. They are vital cowbird hosts simply because they are one of North America's most common bird species. They are not endangered by cowbird parasitism, however, because they are so numerous. On the other hand, cowbirds have a big impact on Kirtland's Warblers—not because these warblers raise many cowbirds, but because their own numbers are so low that any breeding failure threatens their existence.

Cowbirds are not an introduced species. They spread east as humans cleared the forests, making the land hospitable to cowbirds. Today, we can't do much about the presence of cowbirds in the East. Yes, we can kill cowbirds in a limited area, as researchers are doing in Michigan to save Kirtland's Warblers. But it is impractical to do this on a huge scale. Besides, the cowbirds would probably move in again.

People have a dangerous tendency to abhor animals that do not fit their notion of how the natural world should work. Birders should remember that not long ago, hunters slaughtered raptors because these birds killed animals that humans valued. But the hunters were not really evil, even though conservationists today often portray them that way. The hunters believed—as many birders now believe about cowbirds—that the raptors were harming other animals and should be eliminated. There is no good and bad here;

rather, these are misguided attempts to control nature.

Humans have altered their environment wherever they have gone, and cowbirds have adapted to the change. It is humans who (almost literally) paved the way for Brown-headed Cowbirds. We need to face the reality of this situation and deal with it scientifically instead of emotionally. Cowbirds are here to stay, regardless of the animosity birders may feel toward this species . . . or toward anyone who dares to say that she enjoys seeing a cowbird once in a while.

Marlene A. Condon has been fascinated by the natural world for as long as she can remember.

LOOKING AT THE BIG PICTURE

by Scott Robinson

The root of the problem is forest fragmentation—not cowbirds

As a researcher who studies the Brown-headed Cowbird, I am often drawn into the debate about cowbird control. I work in Illinois, where cowbird parasitism is a major problem. We have found cowbird eggs in more than 80 percent of the nests tended by Wood Thrushes, Veeries, Scarlet and Summer Tanagers, Red-eyed and Yellow-throated Vireos, and Hooded Warblers.

Cowbirds can commute at least four miles between their breeding and feeding areas, so even songbirds that nest deep inside the largest forest tracts in the state are heavily parasitized. The combined effects of cowbird parasitism and high nest predation rates seem to have turned the fragmented forests of Illinois into population "sinks," where not enough birds are born to replace the adults that die. Many of the songbirds that breed in Illinois probably hatched elsewhere—in the Missouri Ozarks, south-central Indiana, or northern Wisconsin, where cowbird parasitism levels are so low that they have virtually no impact on bird populations.

Scientists who endorse large-scale cowbird control often use my data to support their view. They say, "Surely Illinois provides convincing evidence that we should control cowbirds, at least at a regional scale," and recommend killing them in their winter roosts, where they are most vulnerable. As a bird watcher growing up in western Pennsylvania, I shared this visceral reaction to cowbird parasitism. As a researcher, however, I have come to believe that killing large numbers of cowbirds is not the answer.

One problem with cowbird control is that winter roosts contain birds that breed over much of North America. A control program would kill birds that come from—and will return to—regions where they may not be much of a problem. But the main reason I do not advocate mass cowbird control is that the birds are only a symptom of a larger problem: habitat fragmentation resulting from human land use. Cowbird parasitism may be the most spectacular problem associated with fragmentation, but it is not the only one. Nest predation is also a serious problem; many populations would not be self-sustaining even if cowbird parasitism didn't occur. And browsing deer also destroy foraging sites and nesting cover for many bird species.

We may be able to solve these problems by changing the way we approach land management. A national management plan that restores and protects large (50,000-acre or more) forested preserves would control cowbird populations without killing them. Each preserve should have a core area, far from cowbird feeding areas, where nest predation and deer browsing would also be reduced. Such preserves would provide habitat for the top predators that help control egg and nest predators (such as jays, opossums, and raccoons) but need a large area to roam.

Ultimately, forest songbird populations can be preserved with a balance of small tracts, where cowbird parasitism will always be a problem, and large tracts that produce surplus young birds. If the proper balance is maintained, even severe cowbird parasitism levels in fragmented landscapes will not pose a significant threat to widespread bird populations. Most bird species in the Midwest are not showing steep population declines, even in small forest fragments where there is no measurable nesting success. This tells me that we currently have a balance for most species. But we *must* make sure that the huge state and federal land holdings that often form the core of the largest tracts are not turned over to agencies that would develop them for intensive human use. This is a battle worthy of the fanatical emotions raised by cowbird parasitism.

That said, I do support cowbird control in some situations—for example, to maintain endangered species with small geographic ranges, such as the Black-capped and Least Bell's Vireos, Southwestern Willow Flycatcher, Kirtland's Warbler, and Puerto Rican Yellow-shouldered Blackbird. But we should only control cowbirds in combination with habitat protection. In landscapes where large tracts cannot be restored, local cowbird control may be required to create a network of cowbird-free breeding areas.

We must remember that there is still time; most declining songbirds still have huge global populations, and many species are not declining even though they are heavily parasitized. Rather than adopt partial solutions such as large-scale cowbird control, we should attack the root of the problem: habitat fragmentation. If we succeed now, we may never have to use pest control measures on one of our native songbirds—a bird that may be abhorrent to many, but is a marvel of evolutionary adaptation.

Scott Robinson is a biologist with the Illinois Natural History Survey. His studies of the effects of cowbirds on songbirds populations have received national recognition.

Take your turn. Write to "My Turn," *Living Bird,* 159 Sapsucker Woods Road, Ithaca, New York 14850.

A LITTLE NIGHT MUSIC

An innovative Cornell researcher sheds new light on the night migration of birds

TEXT AND PHOTOGRAPHS BY TIM GALLAGHER

Each autumn millions of songbirds from across North America embark on an epic journey, traveling thousands of miles, usually at night, to reach their distant wintering grounds in Central and South America. And each spring they repeat the process, returning to spend the brief, warm summer months in the North, nesting and rearing young. The phenomenon of migration is one of the most fascinating and most researched aspects of bird study. (Aristotle wrote on the topic more than 2,000 years ago.) And yet, how effective are our current study techniques? Most of what we know about songbird migration is based on observing or banding birds that have landed and, at least temporarily, dropped out of the migration.

According to Ken Rosenberg, chief scientist of the Bird Population Studies program at the Cornell Laboratory of Ornithology, the bulk of the migrant songbirds pass over undetected. "These birds [illegible] to go as far as they can as quickly as possible," says Rosenberg. "They only land when they have to. When we monitor the birds on the ground, we're only seeing a small portion of the true migration that goes over each night."

This could all change in the near future, thanks to the innovative work of Bill Evans, who is developing a method of recording and identifying the nocturnal flight calls migrating birds use apparently to keep track of each other while flying in the dark.

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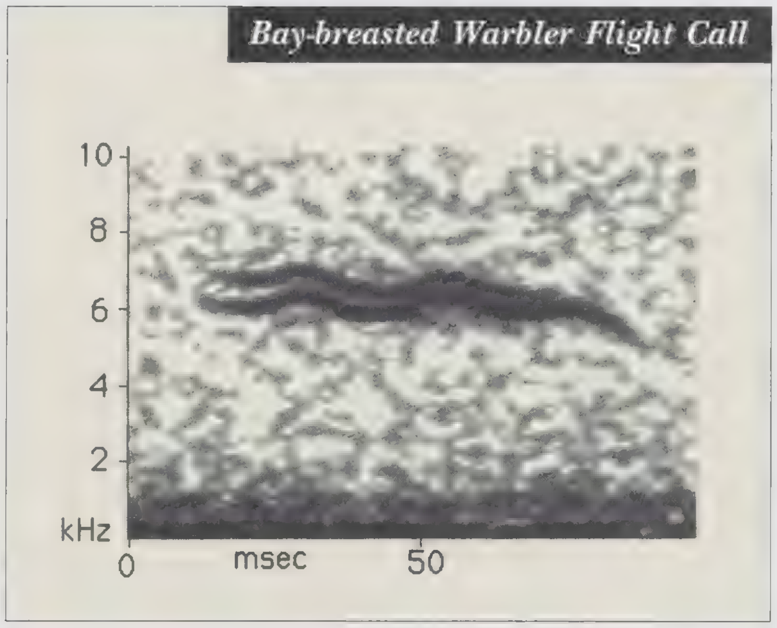
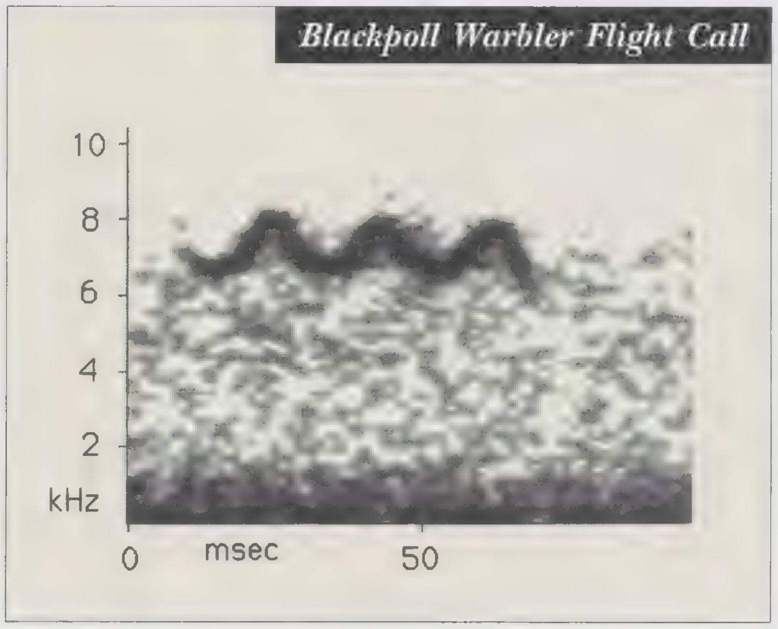
According to Evans, these calls—some of which last only 1/20th of a second—are distinctive and can be used to identify the species of birds passing overhead at night. This could represent a major improvement over existing night monitoring techniques—counting birds that fly across the face of the moon; counting birds that fly through the beam of a ceilometer (a powerful searchlight pointed into the sky); or counting birds with radar—all of which provide data on the numbers of birds flying over on a given night, but little information on their species.


Bay-breasted Warbler Flight Call


Blackpoll Warbler Flight Call

A spectrograph of a bird call turns a sound into a piece of physical evidence that can be compared to other spectrographs. Though the flight calls of Bay-breasted Warblers and Blackpoll Warblers, shown above, are nearly indistinguishable to the ear, they appear vastly different in spectrographs.

After 10 years of independent research, Evans published his first paper on night calls in the Spring 1994 issue of *The Wilson Bulletin.* In the article he differentiated between the similar nocturnal calls of the Gray-cheeked Thrush and the Bicknell's Thrush by comparing spectrographs of the birds' calls. A spectrograph is a computer-generated "snapshot" of a bird vocalization showing the frequency and duration of the sound. Particular nuances of a sound, often too subtle to be heard, show up plainly in a spectrograph. This technology is the wedge that Evans is using to decipher the brief calls and assign identities to each caller.

Turning a sound into a visible image creates a piece of physical evidence that a computer can compare with other spectrographs to isolate a species' "call signature." The spectrographic image of a species' night call can be as distinctive as a fingerprint, offering an effective way to document the presence of a particular species flying over at night.

In theory, this all sounds remarkably easy: simply make a spectrograph of every species' nocturnal flight call, then design a computer program that can recognize the distinctive patterns in each spectrograph and automatically identify the species calling. In reality, Evans's task is much more daunting. The first major stumbling block is correctly identifying all the nocturnal flight calls. "It's easy to recognize a flock of Canada Geese flying over at night," says Evans. "The geese honk the same at night as they do during the day. But the nighttime calls of songbirds are often very different from their daytime calls. And because the birds are flying in the dark, it can be very difficult to determine the identity of the caller."

To solve this problem, Evans has been traveling around the country, recording night calls in areas through which particular songbird species are known to migrate during a given period. So far he's recorded migrating birds in New York, Texas, Florida, and Alabama. Slowly and painstakingly, using a process of elimination, Evans has built up an impressive catalog of nocturnal flight calls, including nearly all the warbler and sparrow species found in eastern North America.

Evans owes the inspiration for his acoustic monitoring technique largely to serendipity. A student at the University of Minnesota during the mid-1980s, he spent most evenings working for a pizza parlor to make ends meet. During spring migration, he would camp out for days so he could watch newly arrived birds passing through the area. "The whole thing evolved out of my frustration at only being able to go birding on weekends," says Evans. "The migration is such a short period. I felt I really needed to be out in the field every day at dawn to experience the rhythm of the migration. And I liked the feeling of waking up at a campsite every morning. I'd sit along a bluff on the St. Croix River and watch flocks of migrating passerines work their way through the trees during the day."

Late one night in May, after delivering pizza all evening, Evans drove to his campsite on the bluff. On this balmy night, he lay awake for hours, his mind focused on the sounds of the night, including the calls of migrating birds passing high overhead. Occasionally he picked out a call that seemed familiar: a Black-billed Cuckoo? It sounded like one. And then he heard another. And another. Though Black-billed Cuckoos are not rare, they are secretive and hard to find during the day. And yet he was now hearing dozens of them flying over. Intrigued, he started counting the calls. Within an hour he had tallied more than 100 cuckoos passing overhead.

The full potential of the phenomenon he was observing hit Evans with the force of an epiphany. "At that moment, I saw the rest of my life unfold before me," he says. "I envisioned recording these nocturnal flight calls and using them to document bird populations for conservation. It just overwhelmed me."

Evans knew nothing about sound recording at the time. He went to an audiovisual store the next morning expecting to be able to buy a tape recorder that would record for an entire night, but discovered that most reel-to-reel and cassette recorders had a maximum continuous recording time of less than two hours. "The salesman recommended that I buy a hi-fi VCR and record on the soundtrack," he says. "That's been ideal. I can record for nine hours on one videotape."

Evans realized what an important tool his night recording technique could be for bird study and conservation. It could provide a method for monitoring bird populations that was entirely independent of any other technique, and could offer separate corroboration of declines or other population trends. What's more, it might be the only way to monitor some of the migrants that nest only in the vast Canadian woodlands, which have few roads. Evans dedicated himself to perfecting this technique. Working odd jobs to finance his project, he set up seven migration monitoring stations in New York State, buying all the equipment, finding volunteers to run the recorders, and analyzing every recording himself.

At 37 years of age, Evans looks boyish, despite his gray hair. In some ways he is an unlikely figure as a researcher—he has neither a doctorate nor even a master's degree. But what he lacks in "paper" he more than makes up for in his drive and the intensity of his focus. Evans records hundreds of hours of nocturnal bird calls during the migration—each of his seven stations records for nine hours every night. Between migrations he listens to all the recordings he has amassed, an incredibly labor-intensive process.

That should change very soon. Evans became a research associate at the Cornell Laboratory of Ornithology in 1994, and he is now working with the Bioacoustics Research Program to develop a computer software program that will automatically identify the species and number of calling birds that fly over a recording station each night during migration. Lab researchers have already developed similar "pattern recognition" software for identifying the underwater calls of whales, and they intend to have two prototype automatic acoustic monitoring stations up and running this spring (see sidebar above right).

What do major ornithologists think of Evans's work? According to Sidney Gauthreaux of Clemson University, who was a pioneer in the use of radar and ceilometers to track migrating birds, the acoustic monitoring technique has tremendous potential. "You'll actually be getting evidence of what's up there," he says. "The calls are probably distinctive enough to be able to identify many of the species that are migrating. But there's a problem with using this technique to count bird numbers, because you don't know how frequently a bird calls."

John Richardson, another prominent radar researcher, concurs. "This could be a big advance over what's available now," he says. "One of our major limitations is always that you rarely know what species you're looking at very precisely. Nighttime migration studies have suf-

SPACE-AGE MIGRATION MONITORING

This spring the Lab's Bioacoustics Research Program (BRP) will set up the first automatic acoustic monitoring stations at two sites on the east coast of Florida. Unlike the stations currently run by Bill Evans, which record for entire nights whether birds are calling or not, the on-site computers at the two automated stations will only record actual sounds and eliminate the empty space between bird calls.

According to BRP assistant director Kurt Fristrup, the computers are capable of performing several functions at once and they can start working out the call identifications virtually as soon as the sounds are recorded. "The computers may not be able to keep up with the calls being recorded on nights with heavy bird traffic, but we should have a complete list of identifiable calls before noon the next morning," he says.

The two stations will be set up only a mile apart so that some of the same birds will pass over both sites, allowing researchers to measure the flight speeds of individual birds. Bill Evans will also be recording with his original equipment at these sites this spring so that he can compare the data supplied by both systems. If all goes well with the computerized system this year, Evans hopes to have many more fully automated stations in operation by next spring.

"This spring we're just trying to demonstrate the system," says Fristrup. "We want to show that this isn't something that might work—it's working right now, and if we can get sufficient funding we can set up dozens more stations." Using fully computerized systems will speed up the processing of data to the point that it will be feasible to have dozens, if not hundreds, of migration monitoring stations in operation. And these systems are designed for on-line use, so researchers will be able to dial up the computers, collect data, check on their performance, and even reprogram them if necessary right from the Lab.

"This is not a small project," says Fristrup. "We have a lot of work ahead of us. But when you think about what Bill Evans is trying to accomplish—setting up a continentwide system for automatically monitoring bird migrations—the possible benefits to ornithological research are staggering."

—Tim Gallagher

fered as a result. Any technique that would help to identify at least some of the birds going over at night could certainly be valuable by itself or particularly in conjunction with radar. But used by itself, you're depending on the birds to call in order to detect them, and you don't know what proportion are calling."

To make matters worse, some species may not even call at night. "Who's ever heard an *Empidonax* flycatcher calling at night?" says Kenneth Able of the State University of New York at Albany, a recognized authority on bird migration. "What about vireos? Do vireos call at night? Maybe we'll eventually find out that they do, but as far as I know at the moment no one hears them. And yet there are obviously a lot of flycatchers and vireos up there."

Bill Evans checks the sound level on a recording deck at one of his monitoring stations in Upstate New York. Each of the seven stations records for nine hours per night during migration, producing a mass of data that Evans currently must evaluate by ear. But with the sound recognition program being developed at the Lab, a computer will simplify the process dramatically, automatically identifying the species of calling birds flying over the stations.

"But what this technique does provide, it provides very well," says Able. "It's going to tell us the composition of some of these warbler migrations; it's going to tell us a lot about thrush migrations; it can give us all these things that we don't have any effective way of getting at present."

Evans is actually not the first person to explore the idea of recording nocturnal bird sounds. In the late 1950s and early 1960s, Richard Graber and William Cochran of the University of Illinois recorded the night sounds of migrating birds. But their research was ahead of its time and they eventually ran into a technological brick wall. "We recorded for about three years with old-fashioned equipment," says Cochran. "When we started out I built a giant reel, bigger around than a basketball hoop. We spliced a lot of reel-to-reel tape together so it could run all night."

Later Cochran, an electrical engineer, designed a timer that would turn the tape recorder on and off, so that it would record only 90 seconds of bird calls every 10 minutes throughout the night. "Dick Graber did the analysis, listening to the tapes—all the hard work. The real limitation was not how much we could record, but how much Dick could listen to. We finally moved on to other projects."

"Computerizing this technique will bring it into the category of a science rather than just a pastime," says Cochran. "Automate it and your sample size can become huge, because it's just a matter of replicating some equipment in the field. Bill's got seven stations out now; he could easily have 70 stations soon. The value of the data will increase exponentially with the number of stations."

"Whether or not Bill succeeds with this will depend a lot on how long he can hold up against the forces of entropy," says Cochran. "I think his call identifications will be accepted. He's really been looking at this thing with a fine-toothed comb; that impressed me."

Evans is fascinated by the patterns of migration he sees emerging through his data. During the past 10 years of recording night calls, most Veeries and Bobolinks have flown over his stations in the last week of August or the first week in September, Rose-breasted Grosbeaks in mid-September, Gray-cheeked Thrushes in the last two weeks of September, and various sparrow species in October. More interesting, Evans has made all his recordings of migrating Barn Owls (an extremely rare species in New York State) during the first week of September, and he actually recorded two Barn Owls during the same hour at stations more than 125 miles apart.

These massive movements of birds, which occur in broad waves, are not the random movements of individuals. Each species appears to have its own migration window that may or may not coincide with other birds on the same breeding or wintering grounds—a window of about a week when the members of a species reach a state of *zugunruhe* (intense migratory restlessness), ready to set off as soon as the weather and wind conditions are right.

Evans has a broad vision for the future of his acoustic monitoring technique. "I believe that someday we'll have microphone stations stretching all the way across North America," says Evans. "A researcher will be able to plug into the Internet and study the migrations of each species on a computer screen, and birders may someday be able to follow the migrations of their favorite bird species on cable television. I can't see any reason why it couldn't happen." ■

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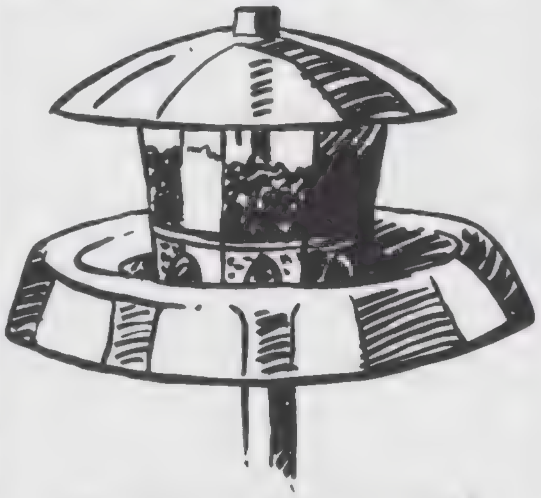

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Piecing Together the Hummingbird Puzzle

BY NANCY L. NEWFIELD

Solving the mystery of Louisiana's winter hummingbirds

> *"Indeed while the Ruby-throated Hummingbird has traditionally been slightly less common at southern Louisiana feeders than the rufous, it was a surprise to see it apparently much less common than the black-chinned this fall, though difficulties of identification make this judgment hazardous; the females and many immature males go unidentified and one might presume them ruby-throateds, yet this year the identifiable birds were mostly black-chinned."*
>
> *—Robert D. Purrington*
> *Central Southern Region Report,* American Birds, *February 1976*

When author Nancy Newfield started feeding hummingbirds at her home in southern Louisiana, all she expected to see were some ruby-throats during summer. To her delight, seven Black-chinned Hummingbirds, at right, and a Rufous Hummingbird stayed on through the winter. Intrigued, she began a trapping and banding study that has gone on for twenty years.

JOE McDONALD

Robert Purrington's words seemed to leap off the page at me. If many hummers went unidentified, how could he presume that Ruby-throated Hummingbirds were more common here in fall than Black-chinned Hummingbirds? If identification difficulties made judgments hazardous, should we rely on presumptions? What would we find if we identified all the birds that previously went unidentified?

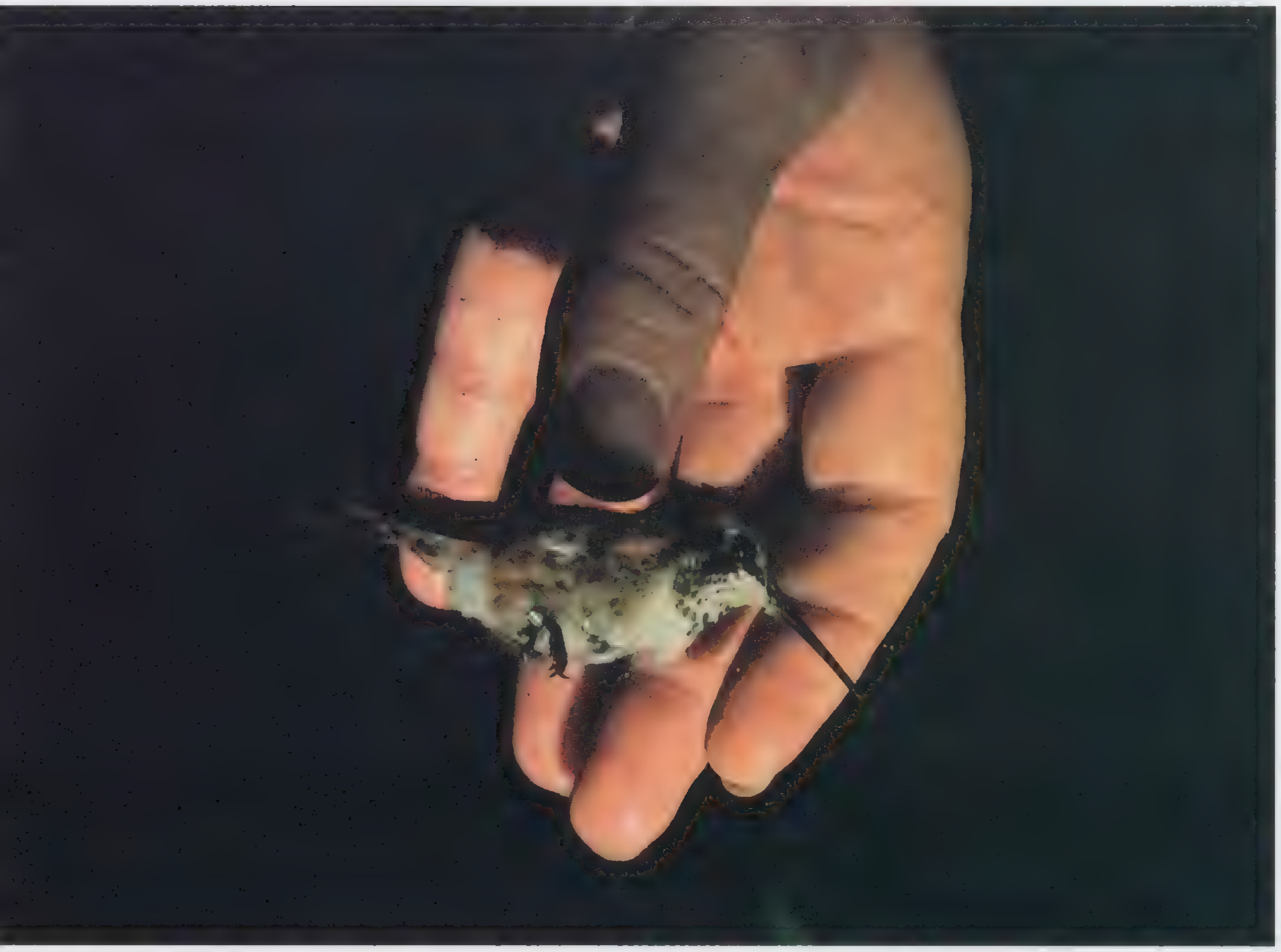
Little did I know then that his words were an invitation to piece together a complex puzzle—a challenge to be in the forefront of one of the most exciting discoveries in Louisiana's ornithological history. And little did I know that those words would ignite a passion that would consume the next two decades of my life.

When I started attracting hummingbirds to my yard in 1975, all I really expected to see were some ruby-throats during the summer. (I lived then and now in Metairie, a suburb of New Orleans.) After the Ruby-throated Hummingbirds departed in October I had a pleasant surprise—as many as seven black-chins and one Rufous Hummingbird stayed on through the entire winter. Was it beginner's luck, I wondered, or could there be more to it?

The next three winters were virtual replays of the first with only minor variations. I met several other people at that time who regularly attracted hummingbirds during the winter. Comparing notes, we agreed that although we occasionally saw Ruby-throated Hummingbirds in winter, they were always outnumbered by Rufous and Black-chinned Hummingbirds. And, each winter, we saw female hummingbirds that went unidentified because field guides told us it was impossible to separate female ruby-throats from female black-chins in the field. Furthermore, we suspected that some birds might appear only once or twice before moving on and being replaced by another bird in similar plumage.

In the winter of 1975-76, local birder Bob Raether hosted a Buff-bellied Hummingbird,

one of the first of that species recorded in New Orleans. He believed that the same bird returned the following winter. But the Rufous and Black-chinned Hummingbirds wintering at my home appeared to be mostly immature males and could not have been returnees. Few adult males were reported, so it seemed that the immatures that survived the winter either perished afterwards or found their way to their species' traditional wintering grounds in subsequent years.



Almost as tiny and delicate as insects, hummingbirds are a challenge to trap and band. Above, the author carefully removes a Rufous Hummingbird from a mist net. Hummingbird bands are so minuscule, you can fit dozens of them into a thimble, at right.

Newspaper and magazine articles written by "experts" always admonish people to remove feeders so that the ready food supply won't entice the hummingbirds to remain far north of their normal winter range, where they would perish from the cold. Though winters in southern Louisiana are temperate by northern standards, none of us wants to be responsible for killing hummingbirds. But if the hummers returned year after year, I wondered, didn't that prove they were surviving the winter? And, if the hummers we saw in winter were not ruby-throats, didn't that imply that these were different birds from the ones that bred in Louisiana?

The questions seemed endless. Was it possible to distinguish female ruby-throats from female black-chins? Were the ruby-throats we saw in the winter the same ones that had been around during the summer? Did an unlimited supply of nectar really keep these birds from migrating? Could it be that the birds moved from one locale to another and were tallied more than once? And where did these birds come from? Where did they go? How many were there?

Louisiana Birds, published in 1974 by George H. Lowery, Jr., lists five species of hummingbirds found in the state. According to the book, the Ruby-throated Hummingbird, the only nesting species, is very rare here in winter, whereas the Rufous Hummingbird is a "fairly regular winter visitor in southern Louisiana." The Black-chinned Hummingbird is listed as rare but regular in winter; eight records for the species are detailed. The volume lists three records for the Buff-bellied Hummingbird, a native of the lower Rio Grande Valley in Texas and farther south in Mexico, and a single occurrence of the Broad-tailed Hummingbird, a summer resident of the Rocky Mountains.

During the late 1970s, the list of hummingbird species for the state grew from five to seven with the addition of an Allen's Hummingbird in 1976 and an Anna's Hummingbird in 1979. Members of the genus *Selasphorus* are notoriously difficult to identify. Female Allen's are identical to female Rufous Hummingbirds, whereas female Broad-tailed Hummingbirds appear somewhat similar. Might Allen's and Broad-tailed Hummingbird females be passed off as Rufous Hummingbirds? Might there be a Calliope Hummingbird somewhere? Could a female Costa's Hummingbird masquerade as a female ruby-throat or black-chin?

I pondered these questions for a time and finally devised a five-year plan for banding and color-marking the birds. Banding could provide some answers and would also be an opportunity to document the rarer species by

NANCY L. NEWFIELD (2)

preserving unique tail feathers and taking close-up photographs. I applied for and received a bird banding and color-marking permit in 1979. Usually, new banders must train with experienced banders, but because there were no hummingbird banders within 1,000 miles, the U.S. Fish and Wildlife Service allowed me to develop my own techniques.

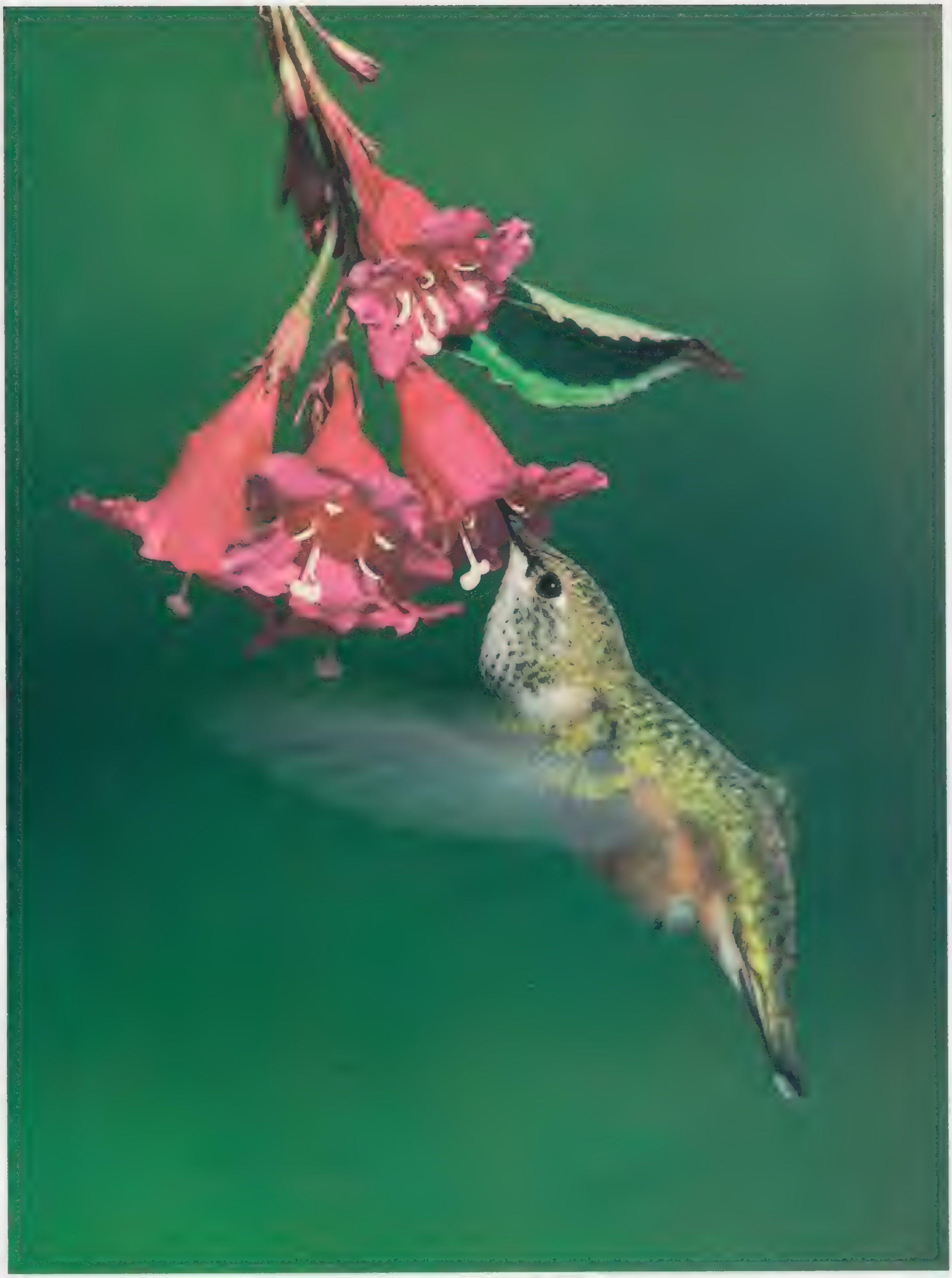
I had a lot to learn. I started by poring over scientific articles and examining museum study skins to find out how to determine with certainty the identity, sex, and age of the hummingbirds I would be handling. I learned that the shapes of certain feathers in the wing and tail and the measurements of the bill, wing, and tail are vital clues for identifying a hummingbird's species. I sought help from professional ornithologists. James Van Remsen, Jr., and John P. O'Neill at Louisiana State University's Museum of Natural Science taught me how to use a caliper to take accurate measurements of a bird's identifying features. I also needed to learn all the pertinent ornithological terms—exposed culmen, wing chord, rectrix, remige.

The tiny hummingbird bands were unlike any bands I'd seen used on larger birds. Instead of ready-to-use bands, I received a small, flat sheet of aluminum with minuscule numbers printed in a grid and a sheet of instructions telling how to form bands from the numbers. It was a tedious task, and each band had to be made perfectly or it could injure a bird.

Catching hummingbirds was another challenge. Mist nets were useful, but the tiny birds sometimes bounced off the net or flew right through the mesh. Eventually I built a better hummingbird trap that effectively doubled the number of birds I could catch. Trying to outsmart the birds was fun.

The first winter (1979-80), I banded a modest number of birds—10 Rufous and 9 Black-chinned Hummingbirds and a single *Selasphorus* hummingbird, whose species I could not positively identify. The following year, Bob Raether invited me to band the birds in his yard. Each winter, he attracted several hummingbirds by providing nectar-producing flowers in addition to feeders—an idea that has proven to be the key to success for Louisiana hummingbirders. He was instrumental in my good fortune.

Soon after, Ron Stein, who lived about 35 miles upriver from New Orleans, asked me to band the hummingbirds in his well-planted garden. He had found an Allen's Hummingbird there in 1976, and he was eager to learn if he was missing anything else. And then numerous other local people started planting gardens to attract hummingbirds, especially


EDWIN G. A. WILLCOX

In southern Louisiana, one of the best ways to attract hummingbirds is to grow an assortment of nectar-producing flowering plants alongside your feeders. Above, an immature male Rufous Hummingbird feeds from a backyard flower.

the winter visitors. Most have succeeded, some with astonishing results. But the number of Ruby-throated Hummingbirds reported each winter has not grown significantly and is small compared with several other hummingbird species.

Ruby-throated Hummingbirds have wintered here successfully, yet there have been no proven returns in subsequent years. Additionally, no records exist of banded ruby-throats remaining after the nesting season or after the southward migration, which peaks in mid-September. Occasionally, tardy migrant ruby-throats appear in early December. But typically in autumn, days or weeks pass during which no ruby-throats are present before the wintering members of that species arrive. (Members of the breeding population usually begin returning in early March.)

Most of the wintering ruby-throats I've handled have been young of the year. Immature hummers have minute corrugations on their exposed culmens whereas the bills of adults are perfectly smooth. Using the bill texture as a criterion, some of these birds seem extremely young, probably products of late nestings. I believe these birds originate north of us and end their migration in Louisiana because they aren't carrying sufficient fat to fuel their rigorous flight to the tropics. Taking up residence at our feeders during winter may be their only chance for survival.

Putting the pieces together, I find that ruby-throats account for only about 7 percent of the wintering hummingbirds. Overall, more people have started attracting wintering hummingbirds and many, many more hummers are now being reported. Four species—Buff-bellied, Calliope, Broad-tailed, and Rufous Hummingbirds—are being reported much more often.

First reported in Louisiana in 1982, several Calliope Hummingbirds like the one at right are seen each year in the state. Are these birds really more common here now then they were previously or are there just more hummingbird watchers to spot them?

RICK & NORA BOWERS

Louisiana hummingbird watchers anticipate the winter season like children awaiting Christmas. Not only has the number of reports increased, but the variety of species has also expanded. The Calliope Hummingbird was added in 1982, and now several are recorded every year. Since 1990, five Broad-billed Hummingbirds and two Blue-throated Hummingbirds have been documented, bringing the total number of hummingbird species known for Louisiana to 10.

The increasing number of winter hummingbird sightings raises a nagging question: has the number of individual hummingbirds wintering in the state really gone up since the 1970s, or is the perceived increase simply a result of more people attracting the birds and more attention being paid to them?

Ornithologist Remsen, who arrived at Louisiana State University's Museum of Natural Science in 1978, is an ardent hummingbird enthusiast. He believes that some of these reports represent actual increases, but he pleads for better statistics. "Are hummingbirds increasing?" says Remsen. "Well, it depends on the species. I would bet that there's been a real increase in Buff-bellied Hummingbird numbers. I'd be much more cautious about the rest, but I could be convinced easily by data from one or two places with relatively constant effort."

"Let's say they are increasing," says Remsen. "Then the question is why? It's hard to separate several factors. The weather could explain it . . . these warmer winters. Another possibility is that people who feed hummingbirds are increasing the birds' survival rates so you get more birds returning."

Indeed, a number of banded birds—Rufous, Black-chinned, Calliope, and Buff-bellied Hummingbirds—have returned in subsequent years. The record goes to a female Rufous Hummingbird that returned to my house for six consecutive seasons. Birds returning for a second or third season usually arrive well before the winter season, and often as early as August.

But, because most of the wintering hummingbirds start showing up in southern Louisiana around Thanksgiving, most of the speculation centers on where those birds are during the two-month period between mid-September and late November. Remsen suspects that many of them actually migrate to Mexico and are then carried northeastward on the jet stream—a narrow band of high-velocity winds in the upper atmosphere. Often in autumn this wind current follows the Pacific coast southward to Mexico, then crosses the central portion of that country and turns northeastward across the Gulf of Mexico.

Remsen's contention raises as many questions as it might answer. The species involved do not all co-exist within the same regions of Mexico. Can a single factor affect all the species or is each species (or even each individual) responding to a different factor? How can upper-level wind currents affect birds that rarely fly more than 500 feet above the ground? Why are we not seeing any strictly Mexican species?

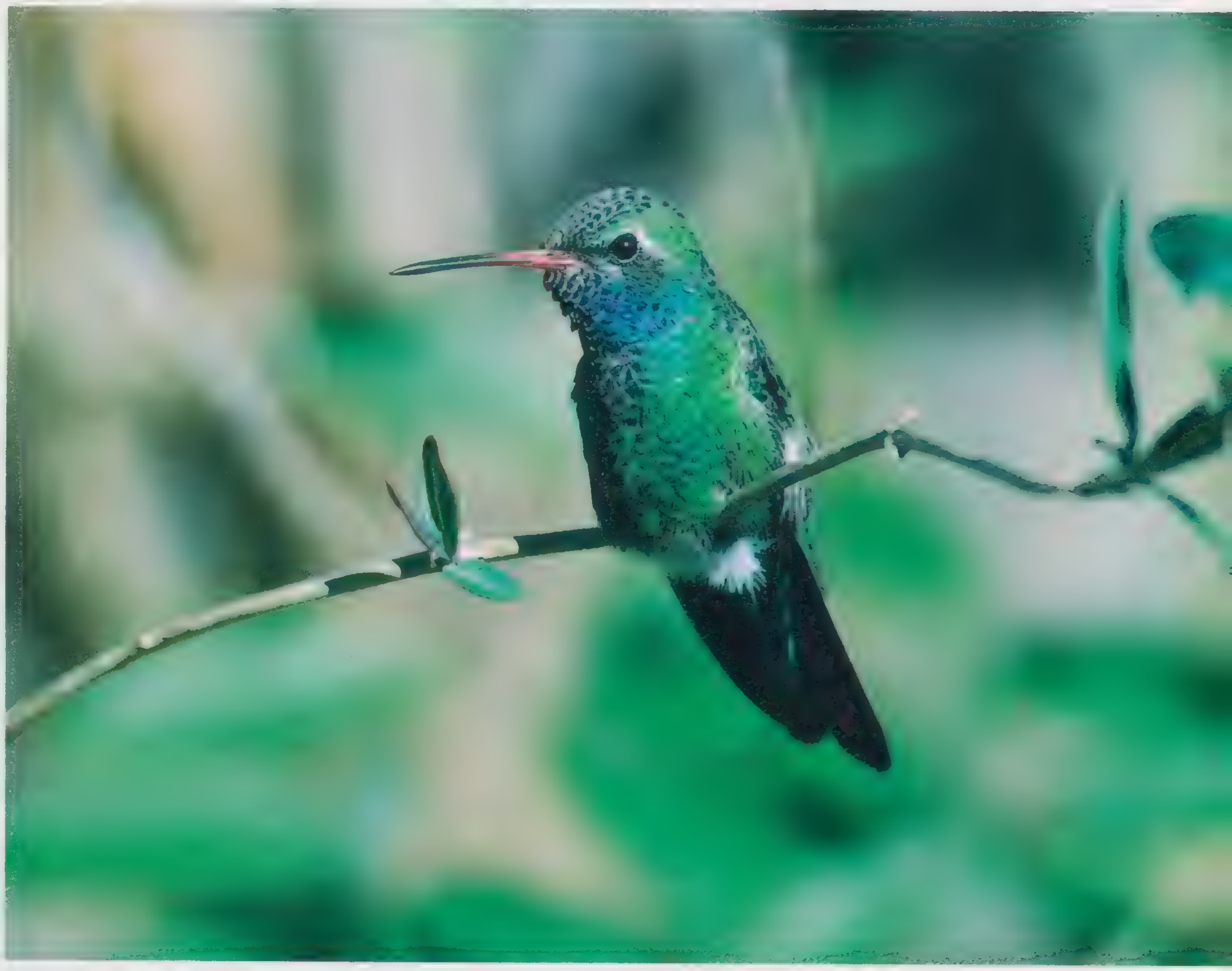
My theory is complex. Perhaps feeders and exotic gardens create habitats in which hummers find enough sustenance to survive most winters. Having enjoyed the ambiance of southern winters, these birds then return to Louisiana in successive seasons. These individuals then perhaps sire progeny that are less inclined to follow their species' traditional migration routes. If suitable habitat is vanishing on the birds' wintering grounds in Mexico, this could also play a role in displacing the birds such a long distance. Perhaps immature hummingbirds, arriving later than their elders, find all the territories in Mexico taken and so are forced to explore new regions.

Remsen believes that feeders may be fueling population growth among several of the western species on their breeding grounds. If this theory is correct, there might be too many young birds for the available habitat in Mexico to support.

"A brooding female can stock up on all the energy she needs and then, because she fulfills her own needs quickly, can spend a much greater proportion of her time searching for the insects that she needs to feed her babies," he ventures. "When she's got eggs, she can spend more time keeping them covered."

That could explain increases of Broad-tailed and Rufous Hummingbirds, but what about Buff-bellied Hummingbirds, which are thinly distributed on the coast of southern Texas—the only section of their breeding range with feeders? It seems unlikely that feeders would be responsible for a Buff-bellied Hummingbird population explosion, if there is one.

It's impossible for me to band every hummingbird that winters in southern Louisiana. With the popularity of feeders and specialized landscaping, hummer reports have escalated far beyond my ability to reach them and I catch only about half the birds at many locales. But two eager sub-permittees will be providing me with better coverage this winter.



Five Broad-billed Hummingbirds, above, have been documented in Louisiana since 1990. The grand total of known hummingbird species listed for the state now numbers ten.

WILLIAM P. BERGEN

I've banded more than 500 wintering hummers and have had numerous returns. Rufous Hummingbirds make up slightly more than 50 percent of the banded birds; black-chins total about 23 percent. Considering the quantity of data amassed over the past 16 winters, I believe the picture of the ruby-throat is relatively complete. But as I think about the other hummingbird species found in Louisiana, I now wonder if we may actually be looking at pieces of several different puzzles. The way things are going, I should easily have enough hummingbird research left to keep me busy for another two decades. ■

Nancy L. Newfield lectures widely and leads birding tours. The author of Louisiana's Hummingbirds *and co-author of the newly published* Hummingbird Gardens, *she also writes articles for scientific journals and popular magazines.*

GARDENING *for* BIRDS

BY STEPHEN W. KRESS

Your garden can grow birds as well as flowers. Here are some bird-friendly projects to get you started.

In the fall of 1988, I purchased an 81-acre farm near Ithaca, New York. A few acres were planted to winter wheat; the rest was rolling hills and creek bottom covered with second-growth maple and hemlock. Three streams worked their way through the property, and an old pond held trout and minnows. I moved there from a one-acre property on Sapsucker Woods Road soon after my book, *The National Audubon Society Guide to Attracting Birds,* was published, so I was eager to try my hand at landscaping for the birds on a grander scale than my small property had permitted.

Knowing that trees and shrubs take years to root and flourish, I immediately planted dozens of serviceberry bushes and dogwood trees. I hoped to help birds by increasing the vegetation layers under a canopy of ancient sugar maples. My noble cause was soon confounded, however.

After digging through a maze of maple roots, I carved out holes for the bare-rooted nursery stock that I pur-

GAY BUMGARNER

Variety is the key to a bird-friendly yard. Break up an expanse of lawn with patches of native wildflowers, then create varying levels of vegetation by planting flowering shrubs in front of taller trees.

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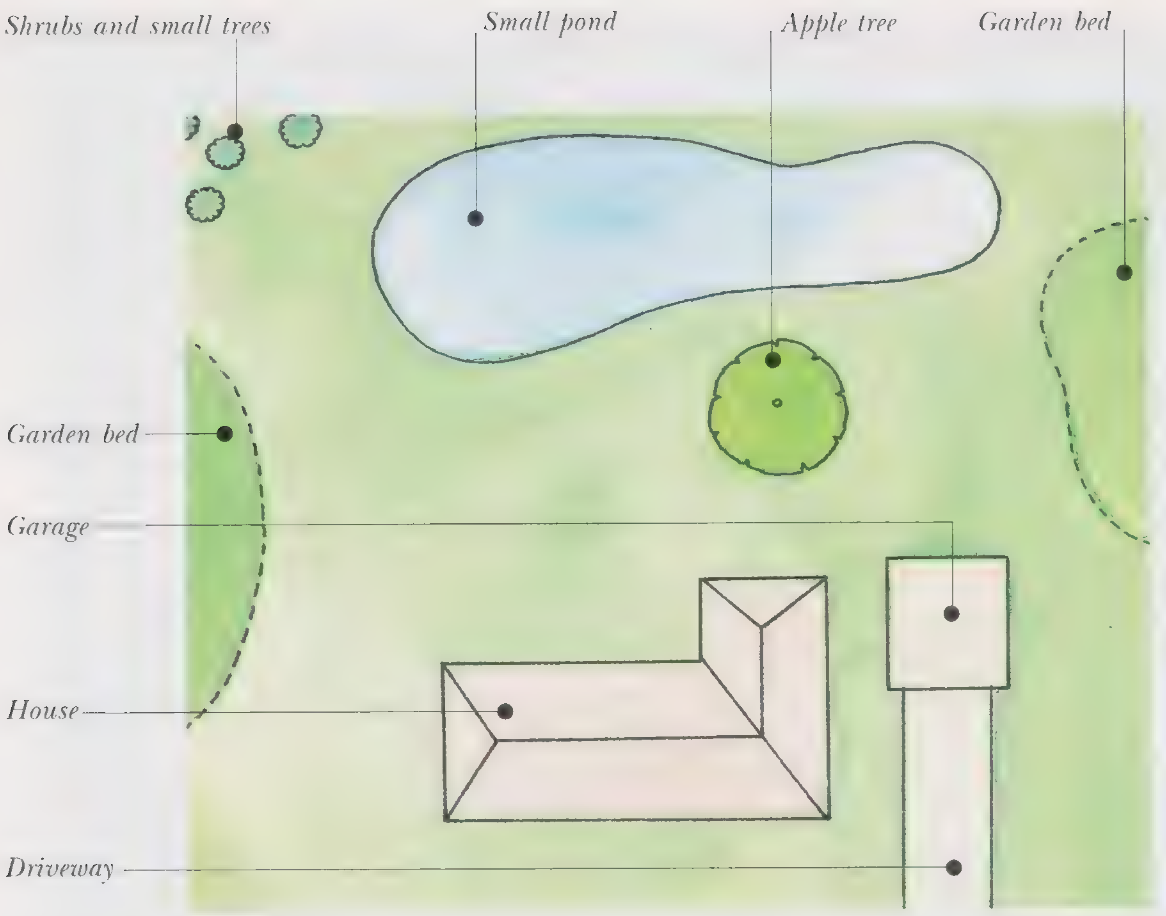
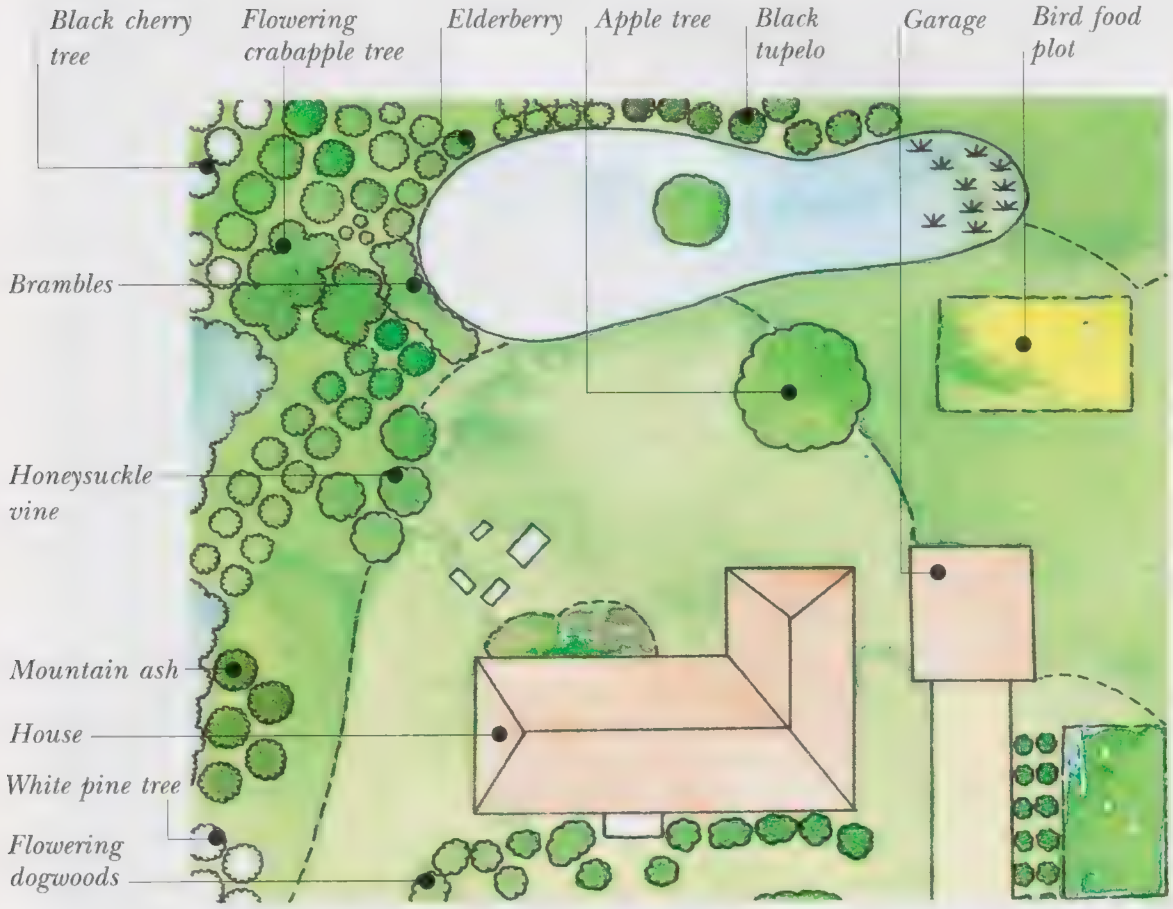


Make a Garden Inventory

Draw up a map of the existing features of your garden. Map the garden's plant communities, property borders, outbuildings, including the garage, greenhouse, and shed. Also include swampy areas, overgrown spots, lawn areas, changes in slope, bird feeders, and nest boxes.



Completed Garden Plan

The second stage is to prepare a final plan that outlines the structure and arrangement of plant communities in relation to the existing features. The white pine and dogwood trees create a small windbreak, and the cherry and crabapple trees, the elderberry shrubs, and a few brambles provide cover and nesting sites. Weeds and grasses are planted in the bird food plot.

chased cut-rate through the mail. I am not sure whether these promising young wisps were too stressed on arrival to root and prosper, but I do know that planting them was only the first step in the struggle to keep them alive.

The saplings I planted in the shade faded over the summer from lack of light. Those in sunny sites died for lack of water. Grasses and goldenrod crowded out saplings, and the few that managed to survive until the first frost were promptly nipped to the ground during the winter by ravenous deer, rabbits, and mice. My first planting season was a complete failure. Over the winter, I reflected on my losses and realized that, despite my good intentions for creating bird habitat, I still had much to learn about gardening.

My new book, *The Bird Garden* (DK Publishing, Inc., 1995), draws on the lessons I learned on my farm. This article, excerpted from Chapter One, describes several projects that will meet the varied needs of birds for food, water, nest sites, and cover. Regardless of the total size of your property, one principle applies: the variety of bird species that regularly visit your backyard will increase if you carefully manipulate both the physical structure of the vegetation and plant succession. The wise owner of an average-sized backyard can increase the variety of vegetation by replacing an expansive, close-cropped lawn with more creative landscaping. If you choose plants that have a high value to birds and use them effectively in a good design, your backyard will be both easier to maintain and more alive with birds. Native plantings that benefit birds can be as attractive as horticultural specialties from distant lands.

Analyzing the Site

Before attempting to improve your property for birds, draw up an inventory to see which birds currently visit it. List the most numerous birds that visit, how many of each, and whether they are nesting in the backyard. Ideally, do this during each season.

The location of the property—a built-up city, a busy town, a rural area surrounded by farmland—and its proximity to oceans, lakes, rivers, or streams will, to a certain extent, dictate the number and variety of species that visit. However, there is always something of interest in the backyard, and rare visitors can show up at any time, especially during the migratory seasons.

Deciding what to Grow

With the inventory complete, plan on paper what changes you might accomplish to improve your property for wildlife. The plan will depend largely on the size of your property and the time and finances available to you, but it will also vary according to the birds that you hope to attract. This, in turn, will help you decide which trees, shrubs, groundcovers, and vines should be retained and encouraged, and which should be replaced by plants that attract the birds of your choice.

Your previously held views on gardening may have to change. If you are someone who pulls up every weed the minute it raises its "ugly" head, think about the consequences for the birds.

The primary factor to bear in mind is that the structure of plant communities and their arrangement are the keys to successful bird-attracting. Bird variety is greatest where two or more plant communities work in harmony in the backyard.

VEGETATION VARIETY

Even within the same habitat, each bird shows a strong preference for the specific height at which it feeds and nests. This is most apparent in forests, where some birds, such as tanagers and grosbeaks, sing and feed in the canopy but nest in the subcanopy. Others, such as the Chipping Sparrow, may feed on the ground, nest in shrubs, and sing from the highest trees. These bird movements demonstrate that a multilevel planting design is important.

Backyard vegetation can be improved in various ways. Shade-tolerant shrubs such as dogwood, holly, and serviceberry, as well as honeysuckle and other vines, can be planted near larger trees to improve food supplies and provide nesting places for birds. When you are selecting border plants, mix several different shrubs rather than choosing just one species. Varying levels can also be created by planting both tall and small spreading shrubs and a few bird-attracting groundcovers. This type of planting will ensure a variety of shapes and densities.

Adding levels to a plant community increases surface area by creating more leaves, stems, nooks, and crannies on which birds can nest, feed, and sing. Insects live on leaf and stem surfaces and, since most birds feed on insects for part of the year, these surfaces provide a good food source as well as nesting materials for birds.

HEDGEROWS

Shrubby hedgerows are very important to birds. Their form and shape provide secure nesting sites and shelter from extreme summer and winter weather. Hedgerows also create cover so that avian predators such as hawks will not be able to see their prey easily. If your hedgerow is planted wisely, birds will come to the profusion of insects and ripe fruits available throughout the year.

Hedgerows create an effective windbreak and provide a privacy screen from neighboring properties. Clusters or rows of shrubs can also be used to separate areas in a larger backyard, as well as adding a pleasing visual variety.

Hedgerows are particularly important for bird populations in larger cities, or in rural areas where changes in agricultural methods have resulted in their removal. Hedgerows in rural communities ought to be retained or replaced, because of their value to birds.

THICKETS

Rapid-growing thickets thrive at the edges of woodlands. When these are planted next to fruit-producing shrubs, the thickets become especially attractive to birds. Low trees and shrubs such as hawthorn, wild rose, juniper, mesquite, and raspberry have well-armed stems that deter browsing rabbits and

TIPS FOR TRANSPLANTS

Great satisfactions await the successful bird gardener, but success requires abundant care at planting and follow-up maintenance during the first few growing seasons.

1. Plant young deciduous trees and shrubs as soon as they arrive from the nursery, before roots dry out and leaves begin to appear. Prune back some of the branches to reduce moisture loss and give the roots a chance to grow.

2. During the first growing season, ample water is a major concern. Mulch around the base of trees with wood chips to retain soil moisture. Also, weed out aggressive plants such as grass and goldenrod that can take too much water and shade young plantings.

3. Protect new trees and shrubs from deer, rabbits, rodents, and sun-scalding by placing plastic sheaths or hardware cloth barriers around the trunks.

4. Shade-tolerant trees and shrubs may "tolerate" shade, but they don't like it. Even forest understory trees and shrubs such as flowering dogwood and serviceberry do better in full sun, or at least near the edge of larger shade trees.

MARIE READ

Don't pull up the weeds—they're free bird food. Above, an American Goldfinch munches on thistle seeds. Can't bear the thought of weeds in your yard? Plant a songbird garden and let the flowers go to seed. Sunflowers will attract many birds such as the Lesser Goldfinch, above right.

deer. Thickets also make safe nesting places.

Avoid invasive exotic plants; they will almost certainly spread onto adjacent land. Stick with native plants; they are hardier. Consult your local plant nursery for growing tips.

Lawn

A small, central patch of cropped grassy lawn is practical for viewing yard birds. The birds that regularly feed and make their nests in the surrounding trees and shrubs will venture onto lawns—especially if lured by feeders, birdbaths, and a small dust-bathing area. Yet a simple expanse of cropped lawn is one of the most uninteresting bird habitats that you can find in a backyard.

Groundcovers

Although the American Robin feeds on earthworms and insects it finds in lawns, other birds, such as White-throated and Fox Sparrows and towhees, prefer feeding among fallen leaves, where they can scratch for insects. Such habitats are too often missing from a manicured yard. Large areas of lawn make even less sense in a dry climate. Planting groundcovers that have adapted to local growing conditions is preferable.

Plants that produce berries in large quantities on a regular basis are a reliable food source for many birds. Some low-growing, spreading plants, such as bearberry, bunchberry, cotoneaster, and creeping juniper, are more useful to birds than groundcovers such as Boston ivy and periwinkle. Although these plants are an effective alternative to lawn (especially in shady areas), choose carefully to grow groundcovers that provide food.

Leaf-litter

Even robins suffer if lawns are the only feeding habitat available in the garden, so plant leafy borders at the edges of a lawn. Borders of decomposing leaf mulch give robins, thrushes, and Fox Sparrows a place to scratch for worms and spiders.

Overzealous gardeners rake away leaves, thus depriving ground-feeders of food. A good place to create a leaf-littered area is under shrubs and trees where grass grows poorly. Avoid raking this area and try to extend it several feet by adding a few inches of fallen leaves to the litter each fall. By spring, the accumulated leaf-litter should become rich soil, filled with earthworms and insects for migrants to eat.

Artificial slopes

Ground-feeding birds such as sparrows and towhees are attracted to abrupt changes in ground slope. In natural habitats, birds often forage along stream banks and rocky outcrops and among tree roots; these habitats have a wealth of crevices and crannies in which to dig and probe for hiding insects, worms, and other small animals.

HUGH P. SMITH, JR.

When you design a landscape for birds, create artificial slope changes by building a gently sloping soil mound, then add a steep rock face. The rock face provides the tiny crevices used as hiding places by insects and spiders.

Building a rock garden or a stone wall at the property boundary or between two areas—for example a rose garden and a kitchen herb garden—also provides an abrupt change in elevation.

On larger properties, the opportunities for creating varied slopes are even greater. A backhoe moves more earth than a small shovel and a wheelbarrow, allowing you to construct miniature cliffs that can be landscaped with groundcovers, shrubs, and rotting logs.

When choosing plants for these slopes, select a combination of evergreen, semi-evergreen, and deciduous groundcovers and low-growing species that prefer well-drained soil. Plants that flower and fruit at different times of the year will bring the widest variety of species to your backyard.

CREATING WINDBREAKS

In windy provinces and in the prairie states, windbreaks are an important technique for protecting soil, plants, animals, and buildings from the impact of wind. On a smaller scale, a windbreak protects a backyard and the edges of a property. If planted with birds and other wildlife in mind, a windbreak provides both protection from harsh winds and useful habitat. For most yards, a windbreak two or three rows deep is adequate, but for larger properties, one to six rows is preferable. The length of the windbreak is more important than the width. If space is a limiting factor, sacrifice the width to increase the length.

Plant the tallest trees at the back and the lowest at the front edge. Vary the kinds of trees and shrubs within each row and select those that flower and fruit at different times of the year to encourage a variety of birds.

Mix fast-growing and slow-growing trees and shrubs in the windbreak to ensure the provision of cover over a longer period. Evergreen conifers provide seed crops and shelter from extreme weather, deciduous trees provide food and nesting cavities, and shrubs provide additional nest sites and fruit crops. Establish a row of herbaceous cover on the edge of the

NATIONAL AUDUBON SOCIETY

The BIRD GARDEN

A comprehensive guide to attracting birds to your backyard throughout the year

STEPHEN W. KRESS

Foreword by Roger Tory Peterson

National Audubon Society

REGIONAL GUIDE TO TREES AND SHRUBS

NORTHEAST REGION

Trees	*Scientific name*	*Height (ft.)*
American Mountainash	*Sorbus americana*	40
Downy Serviceberry	*Amelanchier arborea*	20-40
Eastern Redcedar	*Juniperus virginiana*	50
Flowering Crabapple	*Malus magdeburgensis*	8-50
Flowering Dogwood	*Cornus florida*	3-10
Hawthorn	*Crataegus flabellata*	15-35
Red Mulberry	*Morus rubra*	25-40
Sugar Maple	*Acer saccharum*	70
White Oak	*Quercus alba*	100
Shrubs		
American Cranberrybush	*Viburnum trilobum*	8
American Elderberry	*Sambucas canadensis*	15
Brambles	*Rubus* spp.	10
Common Spicebush	*Lindera benzoin*	15
Highbush Blueberry	*Vaccinium corymbosum*	6-15
Nannyberry	*Viburnum lentago*	10
Northern Bayberry	*Myrica pensylvanica*	3-8
Pagoda Dogwood	*Cornus alternifolia*	30
Red-osier Dogwood	*Cornus stolonifera*	4-8
Staghorn Sumac	*Rhus typhina*	15
Wild Rose	*Rosa virginiana*	4-6

SOUTHEAST REGION

Trees	*Scientific name*	*Height (ft.)*
American Holly	*Ilex opaca*	50
American Sweetgum	*Liquidambar styraciflua*	120
Black Cherry	*Prunus serotina*	50
Black Tupelo	*Nyssa sylvatica*	60
Common Persimmon	*Diospyros virginiana*	30-50
Laurel Oak	*Quercus laurifolia*	60-70
Loblolly Pine	*Pinus taeda*	100
Red Buckeye	*Aesculus pavia*	20
Sassafras	*Sassafrass albidum*	50
Shagbark Hickory	*Carya ovata*	100
Sugar Hackberry	*Celtis laevigata*	100
Shrubs		
Arrowwood Viburnum	*Viburnum dentatum*	15
Rockspray Cotoneaster	*Cotoneaster horizontalis*	2-3
Inkberry	*Ilex glabra*	8
Possum Haw	*Ilex decidua*	10-20
Weigela	*Weigela florida*	8
Winterberry	*Ilex verticillata*	10
Yaupon Holly	*Ilex vomitoria*	25

PRAIRIES AND PLAINS REGION

Trees	*Scientific name*	*Height (ft.)*
American Plum	*Prunus americana*	20-35
Cockspur Hawthorn	*Crataegus crus-galli*	30
Common Hackberry	*Celtis occidentalis*	30-50
Gray Dogwood	*Cornus racemosa*	9
Ponderosa Pine	*Pinus ponderosa*	150

PRAIRIES AND PLAINS REGION *(continued)*

Trees (continued)	*Scientific name*	*Height (ft.)*
Sargent Crabapple	*Malus sargentii*	6-14
Shrubs		
Common Chokecherry	*Prunus virginiana*	6-30
Coralberry	*Symphoricarpos orbiculatus*	2-5
Franchet Cotoneaster	*Cotoneaster franchettii*	10
Desert Willow	*Chilopsis linearis*	6-25
Flowering Currant	*Ribes sanguineum*	6
Ocotillo	*Fouquieria splendens*	10-15
Snowberry	*Symphoricarpos albus*	6
Three-leaf Sumac	*Rhus trilobata*	12

MOUNTAINS AND DESERTS REGION

Trees	*Scientific name*	*Height (ft.)*
Colorado Spruce	*Picea pungens*	150
Hawthorn	*Crataegus laevigata*	20
Rocky Mountain Juniper	*Juniperus scopulorum*	30-40
Shrubs		
Blueberry Elder	*Sambucus caerulea*	30-40
Brittlebush	*Encelia farinosa*	3-4
Butterfly Bush	*Buddleia davidii*	15
Golden Currant	*Ribes aureum*	3-8
Mesquite	*Prosopis juliflora*	30
Shrimp Plant	*Justicia brandegeana*	3
Western Thimbleberry	*Rubus parviflorus*	3-6
Wolfberry	*Lycium* spp.	6

PACIFIC COAST REGION

Trees	*Scientific name*	*Height (ft.)*
California Live Oak	*Quercus agrifolia*	75
Desert Olive	*Forestiera neomexicana*	6-10
Giant Arborvitae	*Thuja plicata*	50-70
Madrone Pacific	*Arbutus menziesii*	20-100
Mountain Dogwood	*Cornus nuttallii*	10-40
Sitka Mountainash	*Sorbus sitchensis*	15-30
Toyon	*Heteromeles arbutifolia*	6-35
Shrubs		
Bird of Paradise	*Caesalpinia gilliesii*	15
Buffaloberry	*Shepherdia argentea*	3-7
California Lilac	*Ceanothus* spp.	varies
European Red Elder	*Sambucus racemosa*	10
Flowering Maple	*Abutilon megapotamicum*	10
Lantana	*Lantana* 'Spreading sunset'	3
Mahonia	*Mahonia pinnata*	6+
Ninebark	*Physocarpus opulifolius*	10
Oregon Grapeholly	*Mahonia aquifolium*	1-6
Red Sage	*Salvia greggii*	2-3
Sugar Bush	*Rhus ovata*	10
Twinline Honeysuckle	*Lonicera involucrata*	2-3
Wax Myrtle	*Myrica cerifera*	20

windbreak to provide another source of food and nesting habitat for pheasant and quail (in country areas) and ground-feeding birds such as sparrows.

SELF-SEEDING FOOD PATCHES

Wild plants, such as ragweed, amaranth, lamb's-quarter, bristle, and panic grasses, are among the most important bird foods. Weed seeds are abundant in the soil and grow as soon as the ground is tilled. Once a small patch of wild plants is established in your backyard, you will have a regular supply of seeds for future growth. A patch devoted to tall native grasses also provides useful cover.

During the cold winter months, when food is scarce and birds require extra amounts to keep warm, they spend the greater part of the day searching for food. It is the same during the long summer months, when nestlings must be fed regularly. A ready-made food patch can help birds with this endless search and, at the same time, give the backyard bird watcher the pleasure of watching the parent birds as they forage for nutrient-rich seeds.

FRUITING TREES AND SHRUBS

It takes a wide variety of fruiting trees and shrubs to adequately feed wintering birds. To ensure that you are able to provide enough natural food, always consider the food-producing abilities of the shrubs you select, and also imagine how they will look with the rest of your garden's landscape design.

A clumped formation provides an attractive focal point for a bird garden. Plants of the same species are likely to fruit at the same time, making larger food supplies available. Ideally, you should plant several different clumps of trees or shrubs that provide food and cover throughout the four seasons, which means including both evergreen and deciduous plants in your final selection.

SONGBIRD GARDEN

If you select garden flowers with many seeds, you will be surprised at the variety of songbirds that will visit your garden bed. In general, annual garden flowers such as sunflowers, marigolds, zinnias, and cosmos provide more abundant food crops than perennials. For this reason, many of the songbirds' favorite flowers belong to the sunflower family.

BIRD-ATTRACTING FLOWERS FOR NORTH AMERICAN SUMMER GARDENS

Asters (*Aster* spp.)
Bachelor's button (*Centaurea hirta*)
Basket flower (*Centaurea americana*)
Bellflowers (*Campanula* spp.)
Black-eyed Susan (*Rudbeckia* spp.)
Blessed thistle (*Carduus benedictus*)
Calendula (*Calendula officinalis*)
California poppy (*Eschscholzia californica*)
China aster (*Callistephus chinensis*)
Chrysanthemum (*Chrysanthemum* spp.)
Coreopsis (*Coreopsis* spp.)
Cornflower (*Centaurea cyanus*)
Cosmos (*Cosmos* spp.)
Crested cockscomb (*Celosia cristata*)
Dayflowers (*Commelina* spp.)
Dusty miller (*Centaurea cineraria*)
Love-lies-bleeding (*Amaranthus caudatus*)
Phlox (*Phlox* spp.), especially *P. drummondii*
Portulaca (*Portulaca* spp.), especially moss rose (*P. grandiflora*)
Plume cockscomb (*Celosia plumosa*)
Prince's plume (*Celosia plumosa*)
Rock purslane (*Calandrinia* spp.)
Royal sweet sultan (*Centaurea imperialis*)
Silene (*Silene* spp.)
Sunflower (*Helianthis annuus*)
Sweet scabious (*Scabiosa atropurpurea*)
Tarweed (*Madia elegans*)
Verbena (*Verbena hybrida*)
Zinnia (*Zinnia elegans*)

EDWIN G. A. WILLCOX

Most of the plants listed above will grow during summer in moist soil throughout North America. Many require open, sunlit areas. Fertilize the soil monthly; water, but do not soak roots; and mulch to keep the plants from drying out during dry periods. Let the flower heads go to seed to attract goldfinches, siskins, and other winter birds. ■

Stephen Kress is a research biologist for the National Audubon Society and an associate at the Cornell Laboratory of Ornithology. He has pioneered techniques for seabird restoration and is a landscaper and gardener for birds at his Ithaca property.

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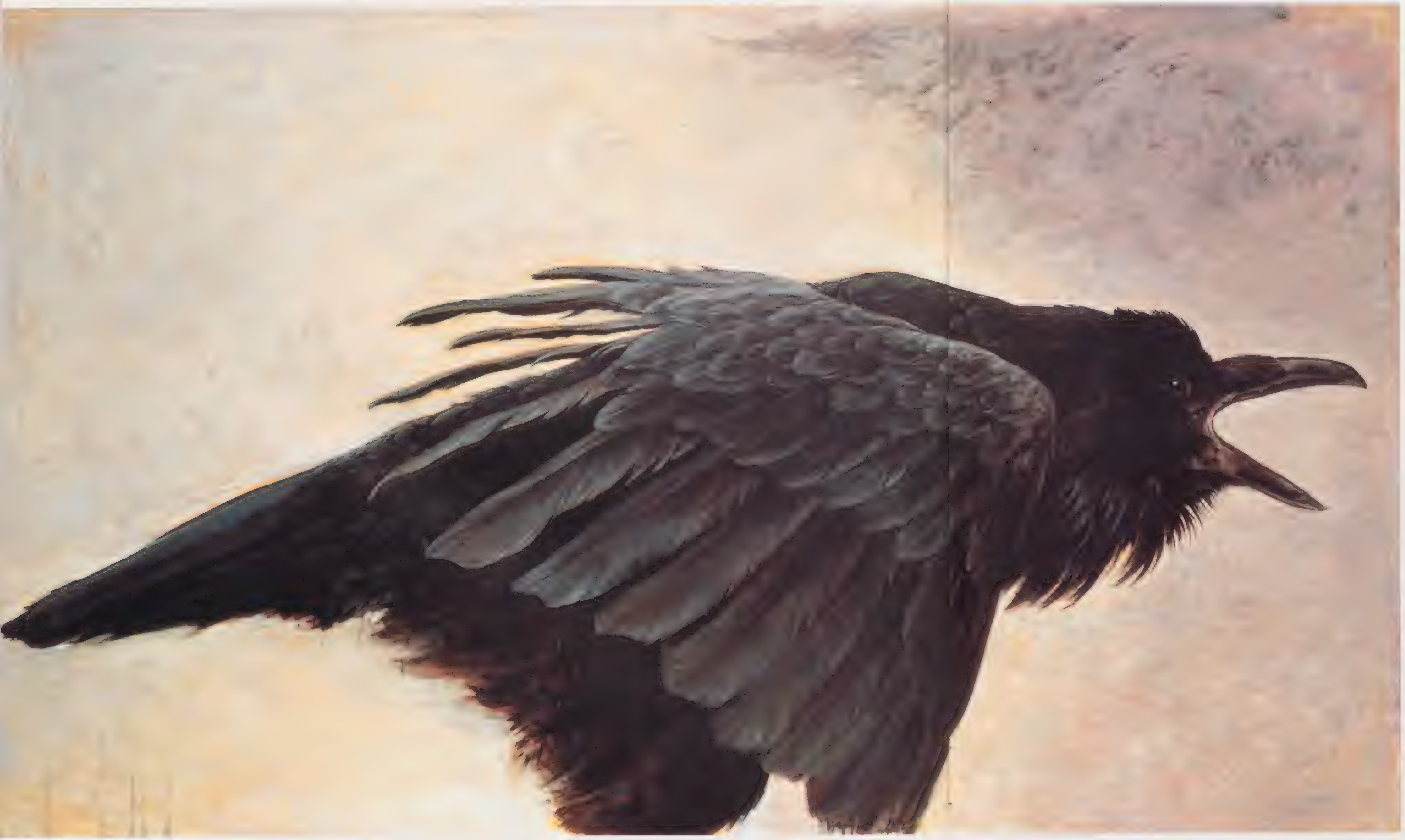
BIRDS IN ART

BY DONNA SANDERS



One entry in the 1995 Birds in Art *exhibition was* The Raven *(1991, oil on canvas), by French artist Henry Bismuth. The dynamic portrait uses a human scale to depict this bird of myth and legend, covering more than 23 square feet of canvas.*

For 20 years the Woodson Museum has hosted "The Olympics of bird art"

In 1976 three sisters opened a small museum in Wausau, Wisconsin. They wanted it to be a tribute to their mother, Leigh Yawkey Woodson, who loved the arts, and a gift to their hometown.

At least, that's what they planned. Instead, the Leigh Yawkey Woodson Museum has become a gift to the world. Its internationally renowned bird and wildlife art exhibitions attract the best artists from around the world. These exhibitions have traveled to museums all over the United States and to China, Japan, Scotland, and England.

The museum's flagship exhibition, *Birds in Art,* is now celebrating its twentieth anniversary. "It is the Olympics of bird art," says Maine carver Charles "Chippy" Chase, who has had a sculpture in every exhibition since 1979 and was named Master Wildlife Artist in 1984.

This prestigious exhibition had unlikely beginnings. The museum wasn't originally conceived as a showplace for bird art; although the sisters did plan to display their mother's complete collection of Dorothy Doughty Royal Worcester porcelain birds, they also intended to exhibit the family's collection of Victorian glass baskets.

"The museum was just a little dream in the background for years," recalled Alice Woodson Forester. Finally, with the support of her sister

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Nancy Woodson Spire and the family of her sister Margaret Woodson Fisher, the dream became a reality. Mrs. Forester and her husband John donated their home as the site for the museum, and it was scheduled to open in the fall of 1976.

"We were so naive," Forester said. "We hadn't even worried about what we would have in the gallery. But we decided we should have something on the walls for the opening. Then John said, 'This is going to be in September. People will be interested in hunting and birds.' Since we were good friends of [artist] Owen Gromme, we decided to ask him if he had some paintings that he could loan us."

The Leigh Yawkey Woodson Museum, above, is internationally known for its Birds in Art *exhibition, which attracts more than 16,000 visitors annually. The exhibition features the work of Americans and also foreign artists such as Sweden's Roland Jonsson, whose painting* Peregrine Falcon *(1994, oil on canvas) is pictured at right. This year the museum and the exhibition celebrate their twentieth anniversary.*

COURTESY LEIGH YAWKEY WOODSON ART MUSEUM

Gromme didn't have enough paintings to meet their needs, but he said, "I have some friends who I think would loan you some." Before Gromme would ask his friends to participate, however, he demanded that the final result be something that both the public and the artists could appreciate. "One reason a lot of fine bird artists don't exhibit is that they can't afford packing, shipping, and insurance, let alone what it would cost to visit the show," he said. The Foresters met his conditions, and *Birds of the Lakes, Fields, and Forests* opened in September 1976.

That first exhibition featured the work of 23 artists, including not only Gromme but other legendary artists such as Maynard Reece, Guy Coheleach, Don Richard Eckelberry, Roger Tory Peterson, Arthur Singer, and George Miksch Sutton. At the close of the exhibition Gromme received a proclamation of appreciation from the other 22 artists in recognition of his "dedication to the fields of wildlife art and conservation during his illustrious career as Wisconsin's premier wildlife artist." That proclamation was the forerunner of the prestigious Master Wildlife Artist Award, which is now presented each year. All in all, *Birds of the Lakes, Fields, and Forests* was an astonishing success, with more than 3,000 people viewing the finest original bird art in North America.

That first exhibition struck a chord that has continued to the present. Renamed *Birds in Art* in 1977, it has become an annual event. In a community of 38,000, it attracts more than 16,000 visitors each year, and its influence stretches around the world. Artists from every continent except Antarctica have been included.

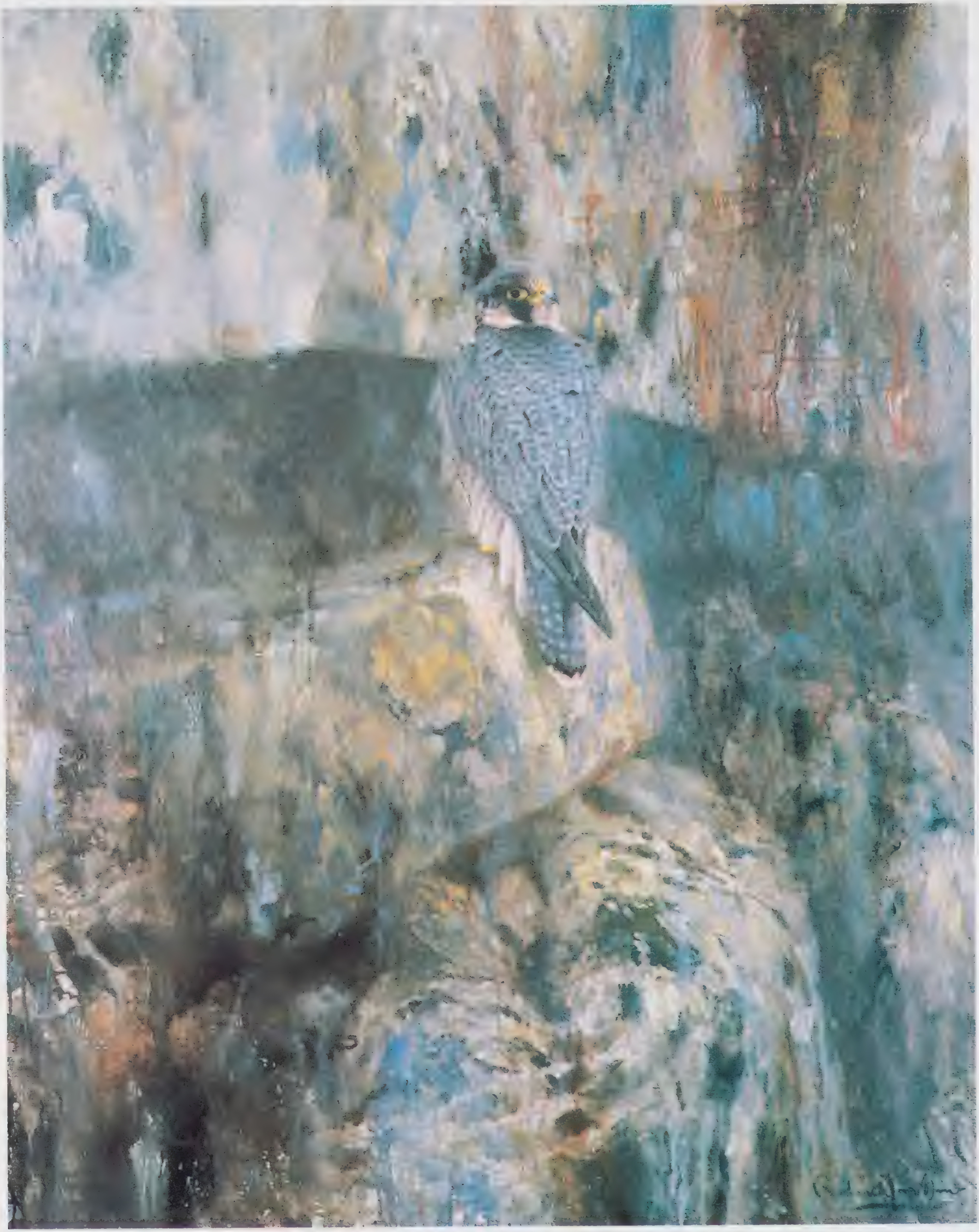
This international flavor started with the very first exhibition, which included the watercolor paintings of Canadian J. Fenwick Lansdowne. Over the years, artists from Canada, England, Sweden, The Netherlands, Scotland, Germany, and Belgium have been routinely included in *Birds in Art*; on occasion, artists from South Africa, Russia, Japan, France, New Zealand, Australia, and other countries have also participated.

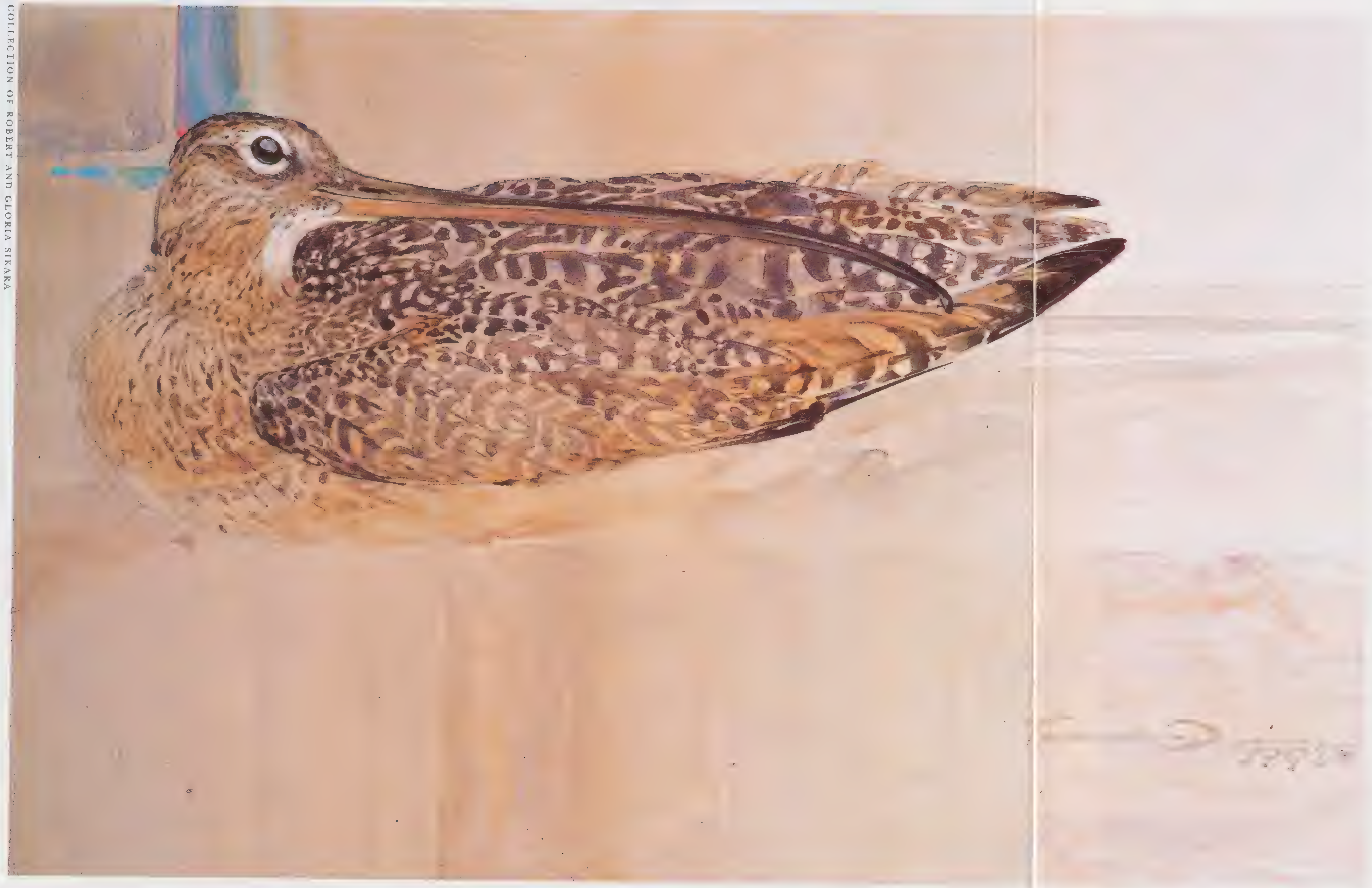
Even though *Birds in Art* started at the top, with the best bird artists of our time, the exhibition has continued to grow, change, and improve. In the first few years, most of the paintings depicted traditional sporting scenes, but as more and more artists submitted their work the images became more diversified. Artists used a greater range of media and showed a broader interpretation of the environment.

The museum's first director, David Wagner, commented in 1985, "We are getting better-quality work in a number of genres. There is a diversification in style, with more loose work as opposed to the traditional tight realism, and a diversification in subject matter, as we are getting birds from around the world. And there are all sorts of environmental interpretations of nature with urban, rural, and wilderness scenes—not just ducks on a pond. There are even birds interacting with human environments."

The museum's second director, Kathy Kelsey Foley, echoed these sentiments in 1991. "The exhibition is not as heavily focused on sporting art or as heavily illustrative," she said. "It has more depth and is more multifaceted, with scientific illustration as well as impressionistic pieces . . . works where birds play minor roles as well as bird portraits."

The demographics of the artists have changed as much as the art. For the first few years only a smattering of women found their way into the exhibition. Today it is no longer unusual





COLLECTION OF ROBERT AND GLORIA SIKARA

for women artists to be included. In fact, the 1995 exhibition features the work of 23 women, or 33 percent of the artists included in the exhibition.

Another change in *Birds in Art* is the way it is judged. In a recent interview Robert Kret, the museum's current director, explained, "In years past, an ornithologist served on the jury. That is not part of the jury process any more. Now, art is first and foremost. The three-person jury views every slide submitted (more than 1,200 in 1995) and evaluates each work for its artistic quality. The number of feathers a bird has is not necessarily as important as the ability of a particular piece to communicate an essence or a feeling."

A change at the Woodson Museum itself is a new-found emphasis on public education. "When the museum started, education was not a primary goal, but the same thing can be said for museums across the country," Kret said. "Museums are striving to find a niche in their communities so they are viewed as meaningful and relevant. *Birds in Art* is very approachable. People are already comfortable with its subject matter. So for us it is a wonderful tool to get people in the door. And because the art works range from very realistic to impressionistic with everything in between, it gives us a chance to discuss different elements of art history through our education programs."

Although the excellence of the art is by now a given, if you ask the artists and museum staff what is special about *Birds in Art,* they often say the people rather than the art. Early in the exhibition's history, photographer and *Birds in Art* consultant George Harrison noted, "Many of the artists say that one of the best things about the exhibition at the Woodson is that they get to meet their peers. They also get to meet people who have had a great influence on their work—like Roger Tory Peterson."

Kret agreed. "The strongest impression I have from the *Birds in Art* exhibition is the impact of the artists being here on opening weekend," he said. Some 70 to 90 percent of the artists who are exhibiting typically attend. Adds Kret, "It gave me an understanding that a lot of the small things this museum does for the artists are really unique. Few museum organizations interact with artists on an ongoing basis like we do."

The artists have responded by showing their appreciation. Every *Birds in Art* opening has been a gala celebration, but the opening of the eighteenth exhibition in 1993 had an extra sparkle to it. It was also the opening of *Natural Wonders: The John and Alice Woodson Forester Miniature Collection.* This collection is a gift from more than 150 artists who had exhibited in previous *Birds in Art* and *Wildlife: The Artist's View* exhibitions. Says Ohio artist David Rankin, "It is the only museum collection of its kind in the entire world that is an artist-driven project, that comes out of the artists' love and gratitude."

Anniversaries other than the eighteenth have also been special. To help celebrate the fifteenth-anniversary exhibition, the museum published an award-winning book about the first 14 Master Wildlife Artists. The twentieth exhibition, which opened this past September, moved to the cutting edge of technology. "We discussed the possibility of recreating the first exhibition," Kret explained. "But it would have been very difficult to reconstruct the first exhibit, to trace all the art work and get it here. We do have images of those original works, however. So we reproduced them on CD-ROM. It's dynamic—it can give the viewers as little or as much information as they would like. Yet it gives the museum an opportunity to provide further interpretation, to try to provide a bridge between the art work and the viewer."

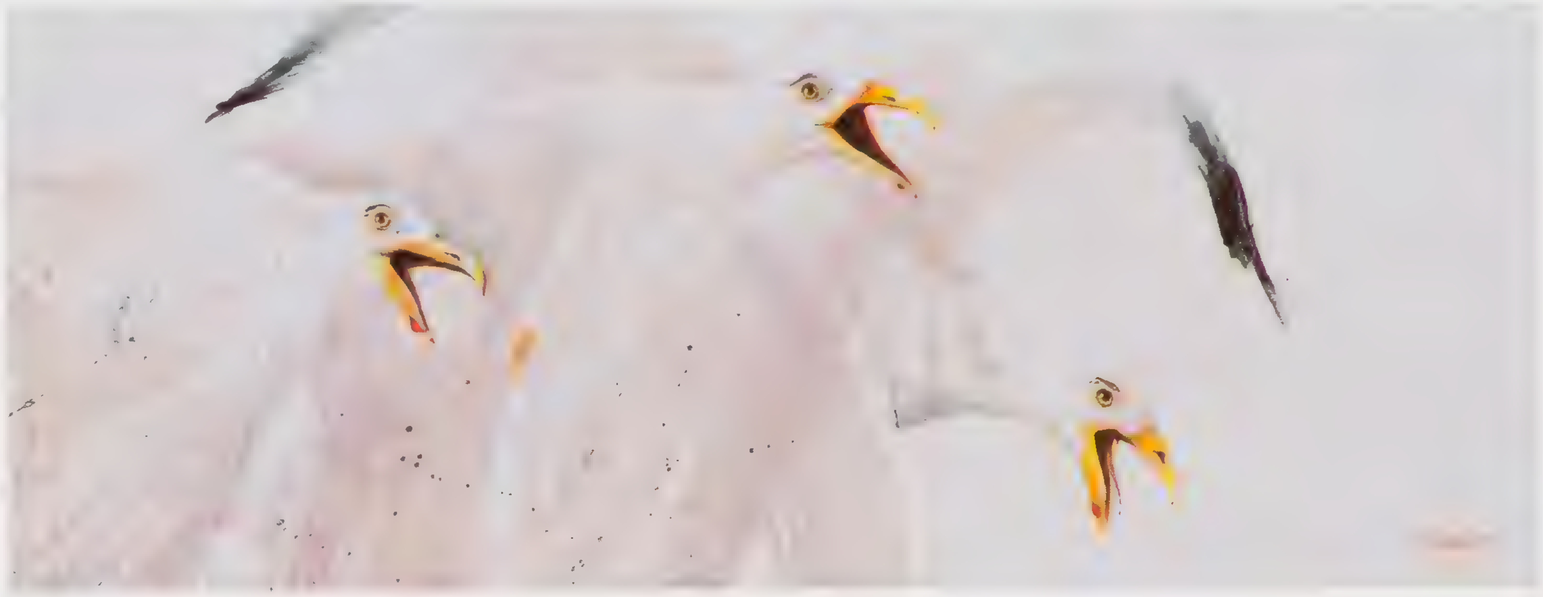
In 1989, when Maynard Reece accepted the Master Wildlife Artist medal, he spoke for many artists when he said: "In the past, many bird artists were limited to painting for a market where they could sell things and thus make a living. The Woodson Museum has given them the opportunity to paint something without worrying about whether or not it will sell. *Birds in Art* has taken bird art beyond the wildlife art shows that are around the country and put it on a plane where it should be."

Robert Caras, an author and broadcast correspondent who specializes in animals both wild and domestic, summed up the museum's first 20 years when he spoke at the *Birds in Art* opening ceremonies this past fall: "This is a museum with depth and breadth," he said. "There is never a low point. It is all wonderful." ■

Donna Sanders is a Wisconsin-based freelance writer whose works have appeared in Wildlife Art *magazine and* Southwest Art. *She has compiled the catalog for* Birds in Art *since 1986.*

Art reproduced here courtesy of Leigh Yawkey Woodson Museum. For more information, write to the Leigh Yawkey Woodson Museum, 700 N. Twelfth Street, Wausau, Wisconsin 54403-5007.

In Folded Curlew *(1993, watercolor), above, California artist Thomas Quinn omitted vegetation and habitat to emphasize the form and pattern of a Long-billed Curlew. Washington artist William Sheppley painted* Downwind *(1994, watercolor), right, to illustrate the powerful flight of Herring Gulls in a following wind.*



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TAKE MY PICTURES . . . PLEASE

Text and photographs by Tim Gallagher

A guide to selling your bird photographs

Having a picture published for the first time is one of the most unforgettable experiences you can have as a photographer. Suddenly your work is being seen and judged by people far outside your small circle of friends. If it appears in a major publication, your photograph may reach thousands of people, many of whom you'll never know.

My first foray into the field of "professional" nature photography was not quite as grand as that, but it was still memorable. I'd heard that my hometown newspaper was planning to run an article on the area's wildlife and they needed good shots of mountain lions, eagles, and other impressive local species. Since I had recently taken some black-and-white pictures of young Golden Eagles for my high school photography class, I stopped by the newspaper on the way home from school one day. Under my arm I held a manila folder containing half a dozen crisp 8x10s of the birds. And the editor bought one. I couldn't believe it. I felt like I was floating above the pavement as I stepped outside.

Though I didn't make much money from that first sale, I knew that somehow I had crossed an invisible barrier. What had been an expensive hobby had suddenly become something that I might actually be able to do for a living. It was a heady experience for a 16-year-old, but even now, I'm still thrilled every time I see one of my photographs in print.

If you're handy with a camera and you like to take pictures of birds, there's no reason why you can't partake of that thrill and get your bird photographs published. Sharing your work with other people who like birds is very rewarding in itself, and the money you'll receive will definitely help take the sting out of the high cost of buying and processing film. But how do you get started marketing your photographs?

Assuming that you already have some high-quality color bird transparencies (most publishers require photographers to use slide film because it reproduces better than color print film), it's relatively easy: first, find some appropriate markets for bird photography, such as magazines and other publications; second, study those markets thoroughly; and third, send a carefully chosen and neatly packaged selection of images to an editor. If you have something that a publisher is looking for, you'll probably make a sale; if not, the staff may at least be impressed by your professionalism and be inclined to use your work in the future.

Many would-be nature photographers lament the lack of opportunities for people trying to sell pictures of birds and other wildlife. Actually, in many ways, things have never been better for bird photographers. The marketplace is full of magazines, book publishers, calendar companies, ad agencies, and others that regularly purchase bird images. You just need to find these markets and approach them with confidence. *Photographer's Market* is a handy reference containing annually updated lists of publishers

This Red-necked Grebe portrait is a good seller, because it captures the color, beauty, and interesting behavior of these birds.

and agencies who regularly buy photographs. Most major chain bookstores and libraries carry this book or its sister publication, *Writer's Market*, which is also a valuable resource for freelancers, especially if you plan to sell articles with your photographs.

Once you've found a few publications that use bird photographs, buy copies of them from a newsstand and study each issue thoroughly. You'll find a great deal of difference in the kinds of photographs various magazines publish, even if they deal with the same general subject matter. One bird magazine might prefer close-up shots of individual species, emphasizing the size, shape, and field marks of the bird, while another magazine might prefer to use a smaller image of a bird in the overall composition of a photograph, emphasizing the bird's habitat or the artistic quality of the image. Knowing the preferences of a given editor or publisher will help you to target your submissions more effectively.

The first step in submitting photographs is to write to a publication's editors and ask for their "Photographer's Guidelines." Most magazines will send you their guidelines free if you send them a self-addressed, stamped envelope. The guidelines will tell you the desired size and subject matter of the photographs, the price paid for each shot, and the terms of the sale—for example, is the publisher buying all future rights to the photograph or just one-time rights? If you're selling all rights, make sure that you're satisfied with the stated price, because you'll never make another dime from that photograph. Fortunately, most magazines only purchase one-time rights.

The next step is to put together a good sampling of your photographs. Don't try to impress the editor by sending in hundreds of photographs. This is one situation where less is definitely more. Boil your photographic collection down to its essence. If that only leaves you with five or ten images, that's fine. As an editor, I'm much more impressed by small packages that contain nothing but excellent photographs than I am by enormous collections of mediocre slides containing a few gems. Don't be tempted to add 50 or 60 lesser slides to fill out your submission. The great slides could be missed by a busy editor who takes a quick glance through your photographs and moves on to the next submission in the stack.

Always use a light table and a loupe to check the quality of your images before sending them to a publisher.

Buy an 8X loupe (magnifier) and a small light table from a camera shop and use them to scrutinize your images. This is the same equipment editors use when they're making their selection—using these tools at home will make you a more critical editor of your own work. If an image seems pretty good, but is perhaps a little too fuzzy, or too light, or too dark, then don't send it to a magazine. Only submit your best work—sharp transparencies with good density and color that capture the essence of the birds you're photographing.

First impressions are important in anything you do, but even more so when you're approaching editors for the first time. The appearance of your package may affect how closely the staff will look at your photographs. Label each slide plainly (and neatly) with your name and address and the species of bird depicted. Then place your slides in clear-plastic protective sheets. Twenty 35mm slides fit into each sheet, providing protection for your images and making it easy for editors and designers to review your work. It only takes a few seconds to put a slide sheet on a light table and scan it quickly for usable images. Sandwich the sheets between two pieces of stiff cardboard to provide further protection during shipping. Use a couple of big rubber bands or masking tape to hold them together.

Type up a shipment description with your name and address and the number of slides or prints being submitted. Keep a copy of this in your files. An accurate shipment description simplifies record keeping for you and the magazine staff. Include a brief introductory letter stating that you're a freelance photographer interested in having your work published in the magazine. Then place the whole thing inside a large manila envelope, write the editor's name and the publication's address on the front, and you're ready to take a trip to the post office. Before you seal your package, be sure to include a large, self-addressed manila envelope with sufficient postage for returning your photographs. It's also a good idea to take out insurance on the package so that you have a record of its delivery.

Once your package is in the mail, all you can do is wait. It may take six weeks, eight weeks, or even longer to receive a reply. Don't despair if you get a few rejections at first. If your photographs are good and you present them in a professional way, your work is bound to get the attention it deserves. ■

To find out how to submit photographs to this magazine, send a self-addressed, stamped envelope to: Photographer's Guidelines, Living Bird, *Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. The Lab's extensive bird photograph collection also needs more images—many of these pictures are used in books, magazines, and calendars. For information on how you can donate photographs and share in the profits made from them, contact Debbie Wood of Visual Services at the above address.*

FOR WANT OF A SPOKEN WORD

by Pete Dunne

At the very heart of birding is communication—the art of projecting matters of consequence to birders who might care.

"Merlin! Going past the lighthouse! NOW!"

"Got IT!"

Or . . . *Beeeeeep.* "Hello, Tim. Pete. Hey, I just left a Ruff in the east pool. If you get this message before sunset you've got a good chance of seeing it."

But all too often—to the hilarity (or sorrow) of those involved—communication is transmuted into its dark twin: *mis*communication, whose only redeeming grace is an ensuing story.

At the top of anyone's list of communication anecdotes is the tale recounted by Brian Bland, a British birder and local guru for residents of Cley-by-the-Sea. It seems that a woman called one day to inquire about a strange bird at her feeder, one "that has red about the face."

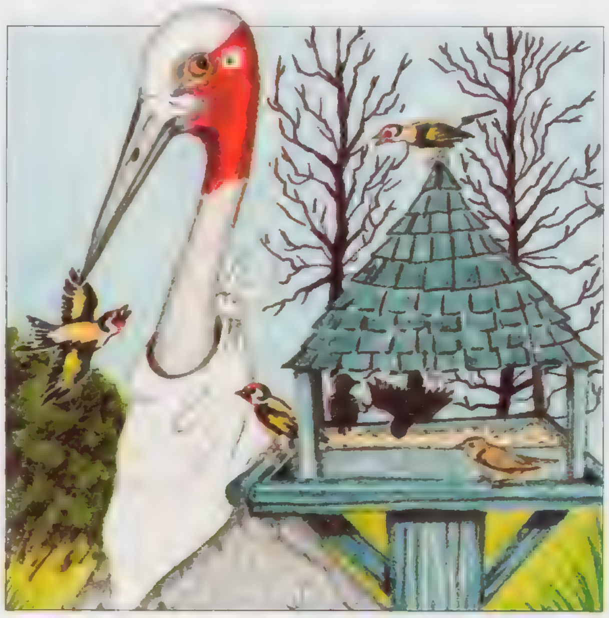
Few feeder birds in the United Kingdom have red about the face. European Goldfinch was the most likely candidate and one that Brian suggested strongly.

"No," the woman asserted. She was quite certain it wasn't a goldfinch.

After several more minutes of fruitless discussion Brian decided to visit the caller's home to see the bird for himself. And there, pecking at the woman's feeder, was not the expected Goldfinch but a Sarus Crane.

"She neglected to mention the bird's size," Brian explained, which—when discussing the differences between a five-inch finch and a six-foot crane—is a very salient distinction.

This incident turned out for the best. Miscommunications that become immortalized as stories usually do not. Representative of this genre is the story related by birder Keith Seager of Cape May, New Jersey. At the conclusion of a program he was presenting to a local garden club, a woman asked for some information concerning a large, white wading bird . . . one that was feeding with other herons and egrets in the marsh behind her farm . . . one that had an oddly shaped bill.



"Odd in what way?" Keith asked.

"Well . . . spoon shaped," the woman replied. "It's gone, now," she added, preempting Keith's next line of inquiry (which would have been something akin to "WHERE DO YOU LIVE?") "But it was around most of the summer," she said. "Are there any herons with spoon-shaped bills?"

Point of fact: Yes, there is one.

Second point of fact: That species has never been recorded in New Jersey.

These sightings-after-the-fact happen all the time (and what birder doesn't have anecdotes relating to tardy reports concerning "reddish hummingbirds" coming to eastern feeders and "all-white owls" that spent all day (yesterday) sitting atop church steeples. But perhaps the most poignant example of miscommunication heralds, once again, from the United Kingdom.

As the story goes, four avid British birders awoke at 0-dark-thirty to chase some mega-tic that had been sighted five hours' drive from where they lived in the London area. They arrived shortly after dawn, happily ticked off the bird on their life lists, and headed home.

When they got there one of them found a message on his answering machine relating to yet another mega-tic—a bird located mere minutes from the one they'd pursued that morning. Undaunted by the 10-hour drive behind them and the 10-hour round-trip chase ahead, the tic-driven foursome jumped back into the car and retraced their steps, arriving at the designated coordinates just before dark.

Scanning the field, first one, then another, and another of their binoculars came to rest on the bird, huddled in the grass a mere stone's throw from the group.

The culmination of a successful chase is sometimes too sublime for words, so the weary foursome stood silently watching as the daylight faded quickly away. Five minutes passed . . . ten . . . then, lowering their optics from their bloodshot eyes, the quartet nodded tiredly to each other and walked slowly back to the car.

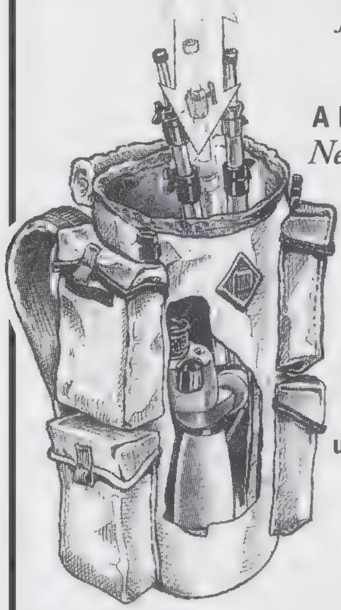
Silence ruled the drive home—silence prompted by exhaustion and ruminations concerning the fortunes of the day. It wasn't until the group was nearly halfway home that one of the quartet gave voice to a thought that pressed heavily upon his mind.

"I guess it must have flown," he lamented, as the others turned to him in astonishment.

I ask you, how would you respond to that?

Or would you? ■

ILLUSTRATION BY JEFF SIPPLE



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GREETINGS FROM SAPSUCKER WOODS

Every day of the work week I try to take a long walk through Sapsucker Woods Sanctuary. It's a habit I got into when I first came to the Lab nearly six years ago. It clears my mind and helps to keep me in touch with a place that has become very special to me.

I'm always struck by the changes I see on my walks—the vibrant green of early spring loses its freshness by late summer; the brilliant colors of the dying leaves at the height of autumn are gradually replaced by the stark black, gray, and white tones of the snow-covered woods in deep winter. And then the process starts all over again.

As I write this column, rain is falling by the bucketful outside, nurturing plants long dormant. The trees, shrubs, and flowers are bursting in a flurry of new growth. The woods are full of newly arrived songbirds, staking out territories, laying eggs, preparing to raise their young.

The growth I see in the woods outside is paralleled by the growth taking place inside the Lab. The existing building is almost literally bursting at the seams with new programs, new initiatives, and new staff. This is a time of profound change at the Lab, as we gear up to expand the facility and strengthen our commitment to bird study and conservation. We look forward to a bright future as we approach the new millennium.

Another change, which I'm saddened to report, is that Cynthia Berger is resigning her position at the Lab. Cynthia came here in 1988 to serve as an assistant editor. She eventually became managing editor of *Living Bird* and editor of our newsletter, *Birdscope*. Her energy and talents will be greatly missed. I wish her well in all her future endeavors.

— *Tim Gallagher*
Editor-in-Chief

Cover: A young Clark's Grebe hitches a ride on its parent's back. Wildlife photographer Jeffrey Rich took this remarkable portrait one warm afternoon last June at California's Lower Klammath National Wildlife Refuge. Several pairs of Clark's and Western Grebes were foraging near Rich as he watched from his floating blind.

Right: According to Cornell researcher Stephen T. Emlen, the family structure and social behavior of White-fronted Bee-eaters, pictured here, have many parallels with human families. Article on page 30. Photograph by Darrell Gulin.

Back Cover: Like Narcissus of old, this handsome male Wood Duck seems infatuated with his own reflection. Photographer Nancy L. Strand used the reflection, branches, and swirling water to create a dazzling, impressionistic view of this most beautiful of waterfowl.

LIVING BIRD

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Letters

DEATH TO COWBIRDS

It may be my imagination, but it seems that over the last few years it has become chic to defend the Brown-headed Cowbird ("My Turn," Spring 1996). No longer do we dwell on the cowbird's effect on songbird populations; now we are supposed to marvel at its methods of reproduction. When I spot a Black-and-white Warbler struggling to feed a cowbird fledgling twice its size, I should now be amazed, not disgusted.

I'm sorry, but the logic that I should not harbor ill feelings toward the cowbird makes no sense to me. If a species has not historically been in an area, but moves in and upsets the balance, it's an alien. The cowbird has a niche to fill in its native area, but not here in Upstate New York.

Robert S. Whitman
Minetto, New York

PRAISE FOR COWBIRDS

I have been interested in the Brown-headed Cowbird question since I first saw one at my feeders. I did not like the idea that these parasites were hurting the birds that I had attracted, but I felt they must have a place in the world. The two essays in the spring 1996 "My Turn" really helped to clarify the issue in my mind: small-scale population control might help save endangered species, but in the long run, if we make the environment unfriendly for them there will be a lot fewer Brown-headed Cowbirds. After all, it was our actions that attracted them, our action can also make the environment unattractive for cowbirds.

Daniel J. Maines
Clifton Springs, New York

Congratulations for having the courage to publish two essays defending the poor, politically incorrect cowbird. I can't help wondering if rampant molothrophobia reflects in part the socioeconomic profile of most American birders: white, affluent, family-oriented. Can such people love black birds exhibiting an alternate lifestyle? Apparently not. How would birders react if Painted Buntings parasitized starlings and grackles? I suspect gleefully.

P. W. Smith
Homestead, Florida

AMERICAN GOTHIC

A small point of historical accuracy: Contrary to popular belief, Grant Wood's famous painting, *American Gothic* ("Prairie Home Companions," Spring 1996), does not picture a "couple" but a father and his spinster daughter.

Gary Wood (no relation)
North Brunswick, New Jersey

You are absolutely correct. We used the term "couple" deliberately, however, for its vagueness. Viewers often interpret the pair as husband and wife, and Wood did not object to this. Incidentally, the woman who posed for the painting was Wood's 30-year-old sister, Nan.

DELIGHT IN ART

Living Bird has become my favorite periodical. I look forward to its arrival, read it thoroughly, and display it prominently. The photography is stunning, the articles, letters, and features are always stimulating, and the presentation of the whole is quite beautiful. The article on the Leigh Yawkey Woodson Museum ("Birds in Art," Spring 1996) was a delight; I just wish I had known about that museum when we were living in the Midwest.

Elizabeth T. Rawlings
Ithaca, New York

We welcome letters from readers. Address letters to: The Editors, *Living Bird*, 159 Sapsucker Woods Road, Ithaca, New York 14850.

BirdNews

BRUCE D. THOMAS

SMALL PREDATORS TAKE A BIG BITE

In the summer of 1994, Cornell University graduate student David Haskell hid some tiny clay eggs in six Ithaca forests. The results of his offbeat Easter egg hunt challenged earlier studies showing that songbird nests suffer more predation in small forest fragments than in large forest expanses.

When Haskell examined the bite marks on his eggs, he found that mice and chipmunks did more damage in large forests than in small fragments (*Conservation Biology*, vol. 9, pages 1316-1318; 1995). Why the contradictory results?

The other studies used quail eggs, which are bigger than most songbird eggs, to measure predation rates. Raccoons, opossums, and crows can crunch up quail eggs, but small-mouthed mice and chipmunks can't get a grip. By failing to measure how many eggs these tiny predators consumed, Haskell says, the quail-egg studies probably underestimated total egg predation rates.

"I'm not saying forest fragmentation isn't a problem for neotropical migrants," says Haskell. "Recent studies of predation on real nests in the Midwest show that it clearly is (*Science* vol. 267; pages 1987-1990;1995). But searching for real nests is time consuming—that's why people started using quail eggs. Clay eggs offer a more accurate alternative."

EAT AND BE EATEN

Two recent studies suggest that birds in winter face a mealtime tradeoff. They can bulk up to beat the cold, but that extra weight may lead to an increased risk of being eaten.

Although birds must be fast and agile to avoid predators such as cats and hawks, University of Glasgow researcher Neil Metcalfe found that a mere seven percent weight gain makes Zebra Finches 30 percent slower and less maneuverable (*Proceedings of the Royal Society of London*, vol. 261; page 395-400; 1995). In a related study, British researchers Andrew Gosler, Jeremy Greenwood, and Christopher Perrins found that Great Tits get lean when their number-one predator, the Sparrowhawk, is around (*Nature*, vol. 377, pages 621-623; 1995). Data from a long-term study show that the average Great Tit's body mass increased in the 1960s after central England's Sparrowhawk population was nearly wiped out by pesticides. From 1969 to the present the Sparrowhawk population rebounded, and the average Great Tit slimmed down.

IMPORTANT BIRD AREAS

Look at a map of the United States, and you'll see a fragile patchwork of protected lands. Are the existing parks, refuges, and preserves sufficient to support and protect our nation's birdlife? A new initiative, the Important Bird Areas program (IBA), aims to find out.

IBA has two main goals: to ensure that existing sanctuaries and preserves provide sufficient legal protection for the birds found there; and to identify new areas that are important to birds but not yet protected.

The American Bird Conservancy and the National Audubon Society are co-leaders in launching the IBA program in the United States, with Audubon directing a state-by-state effort. Birders from state Audubon clubs and the American Birding Association will pitch in to identify new areas. The Cornell Lab of Ornithology is helping out by serving as home base for Audubon's New York IBA coordinator. (He is Jeff Wells, formerly our Project FeederWatch data analyst.)

For more information write to IBA/NAS, 700 Broadway, New York, New York 10003 or send e-mail to <fbaumgarten@audubon.org>.

LIFE LIST ALERT

Kevin McGowan is delighted with the recent changes to *The Check-list of North American Birds.* "I got nine new life birds," says the Cornell University taxonomist, "and I didn't even have to leave my desk."

Published by the American Ornithologists' Union, the *Check-list* is the official accounting of bird species seen on our continent. The recently published "40th supplement" to the list announces new names for some birds, adds some species, and splits some species into two or three separate species. Here are changes of special interest to birders.

Gilded Flicker is now a full species, distinct from Northern Flicker. ("Red-shafted" and "Yellow-shafted" Flickers are still subspecies.)

Florida Scrub-Jay, previously a Scrub Jay subspecies, is now a full species.

Bicknell's Thrush, previously a subspecies of the Gray-cheeked Thrush, is now a full species. ("Careful," warns McGowan. "You can't tell them apart in the field—you have to measure their wings.")

To the delight of baseball fans, **Baltimore Oriole** is an official species again; so is **Bullock's Oriole.** These two were previously lumped together under Northern Oriole.

The Rufous-sided Towhee becomes **Spotted Towhee** in the West and **Eastern Towhee** in the East.

COMPILED BY CYNTHIA BERGER

FIELD GUIDE OF DREAMS

by Mel White

The endless possibilities of birding

I have just about accepted, I think, the notion that I'm never going to play first base for the Yankees. (Although, listen, George Steinbrenner, if you're reading this, you can contact me in care of the editors. . . .) Likewise, the prospect that an audience will rise as one to applaud my performance of the Haydn Trumpet Concerto dims with each passing season—and it was dim nearly to the point of extinction even back when I was practicing every day. It goes on, this list of brass rings missed, growing longer as I plod into my Prufrockian years and my sphere of possibilities shrinks like a leaky balloon.

One of the exceptional rays of light in this gloomy picture is the subject at hand, namely bird watching, and thanks be to my mother and Roger Tory Peterson's books and a world of nice people for leading me to it. Birding offers us endless dreams, and the best thing about it is that many of them can, and some of them will, come true. I can look at a picture of a Greater Bird-of-paradise and—while I have absolutely no prospects today of going to New Guinea—know that I'm not too old, too slow, too untalented, or too dumb to see one someday. And though my someday might be 20 years from now, time will not significantly diminish the chance that I might do it.

For every remote and exotic fantasy, there is also something encouraging and wish-fulfilling that literally could happen this weekend, tomorrow, today. This spring might well be the time, for instance, when a Connecticut Warbler strays west on migration and lingers at a patch of woods I happen to check. (I suspect, though, that a bird-of-paradise is more likely.) I wonder if the reason you see so many birders who are healthy, active, and happy well into retirement is because of the infinite opportunities the hobby provides—something to dream about beyond an evening toddy and a new episode of "Murder, She Wrote."

On my desk sits a field guide to a country I've never seen before; in two weeks, thanks to an unexpected turn of events, I'll be there on a business trip. Once again I have the anticipatory tingle of flipping pages and, like a turn-of-the-century farmer with his Sears and Roebuck wish book, imagining what might be mine. And, boy, is it fun. What the heck is a diuca-finch? (All right, just tell me what a diuca is and I'll figure out the rest for myself.) How about a Warbling Doradito? Could this little golden bird be a possibility?

I must admit that a worm can sometimes show up in this juicy apple. It happens when fantasy turns into obsession, and then mutates into anxiety that spoils a birding trip. There you are on the gorgeous Isla de Pájaros Maravillosos, say, and instead of enjoying the white sand and chattering parrots and margaritas made with fresh limes, you can't think of anything but finding the endemic Isla de Pájaros Maravillosos Dodo-Chat. Singing males of the far more beautiful Zither-voiced Rainbowplume are all around you, but they're common throughout the archipelago, so you barely glance at them. You *absolutely must* find the dodo-chat!

"Hey," says a friend, "let's go down to the beach and hang around with the French Women's National Water-skiing Team. I was talking to some of them at the bar last night, and they're all real friendly."

"Are you crazy?" you say. "I just heard that the dodo-chat was seen last month near the sewer outflow pipe at Ciudad de Barrios. We have to get over there immediately!"

(You go to the sewer pipe and your friend goes to the beach, where a dodo-chat shows up and feeds on a discarded maraschino cherry 10 feet away. "Zee oiseau, eet eez so . . . 'ow you say? . . . cute!" Véronique coos.)

Dreams come true in unexpected ways, and in their own sweet time. On my first trip to Costa Rica I lusted after the Resplendent Quetzal, which certainly ranks near the top on the worldwide list of fantasy birds. Hasn't every birder who's ever planned a trip to Central America stared at the trogon page in the field guide with excited anticipation? For months, I did. The most beautiful bird in the Western Hemisphere, some say. The most beautiful bird in the world, others say. A trip to Costa Rica without seeing a quetzal would be like . . . well, it would be unthinkable.

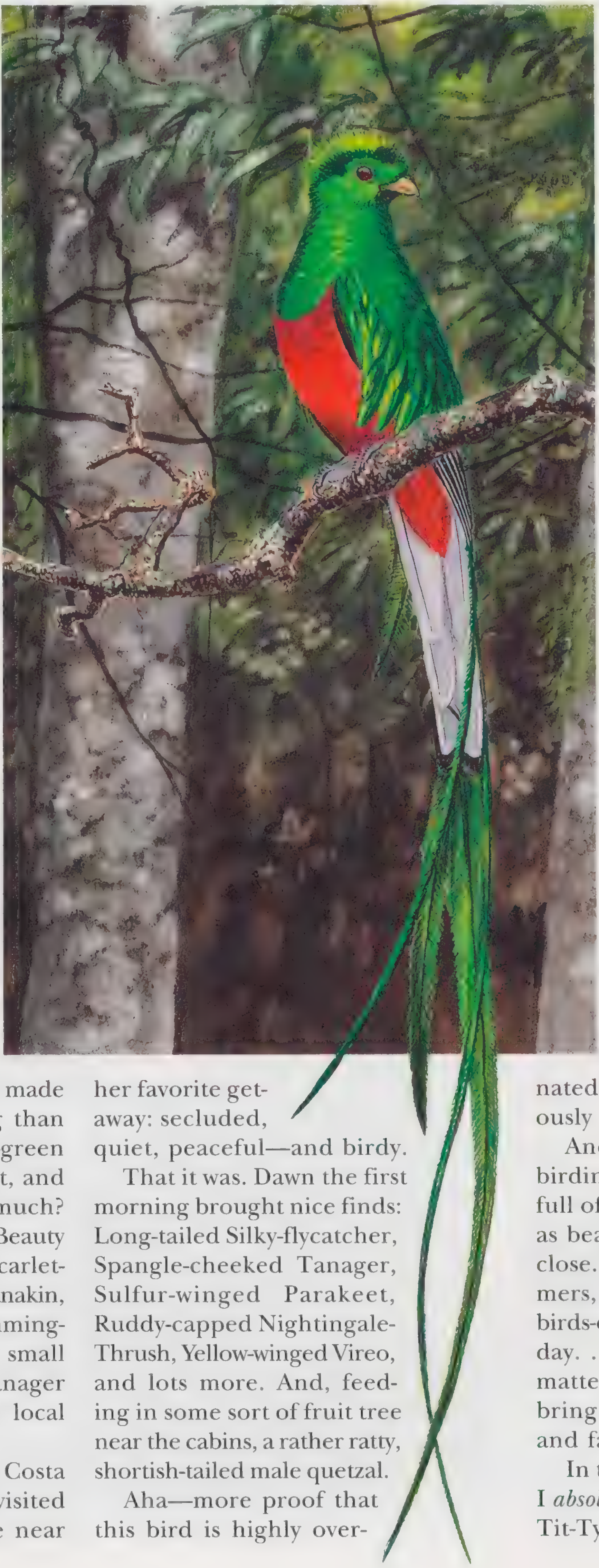
I booked a room near Monteverde, the famous reserve with such a lovely name and such mucky trails. I drove up, got out of the car, and, boom: Violet Sabrewing, Azure-hooded Jay, Emerald Toucanet, Magenta-throated Woodstar, White-eared Ground-Sparrow. Did I enjoy these birds? I think so; I hope so—but I know that my mind was really on the next day, and the chance of seeing a quetzal.

Morning came. Two minutes after the trails opened, I headed toward a fruiting tree where, I'd been told,

ILLUSTRATION BY JOHN SCHMITT

quetzals had been feeding. I hadn't gone 50 feet when, pow: Highland Tinamou. What a strange bird! A whole new order for me. Did I savor the moment?

Look, we gotta keep moving, okay?



And then, quetzals. Way up in a tree, mostly hidden by layer after layer of unbelievably luxuriant greenery, glimpsed through light drizzle and heavy leaf-tip drip. I can still remember the feeling of water droplets splashing on my eyeballs as I stared up—frustrated at having the most beautiful bird in the etcetera perched right above me and not being able to see it well. Soon the little group flew away, and I was left only with the image of a green-and-white rear end disappearing among the branches.

Within the hour, as I poked around elsewhere on the reserve, a female quetzal flew up, perched at eye level a few yards away, and sat there in perfect light like a fat pigeon for several minutes. Now this should have been a thrilling moment . . . but it was probably polluted by the wormy little thought: it's only a female. Would I ever get a good look at a male?

Not on that trip. And, in the ancient tradition of sour grapes, as time passed I started to have serious doubts about this "most beautiful bird" stuff. I sure hadn't seen much myself, and photographs, I decided, made the species seem less stunning than gaudy. The Christmasy red-and-green color scheme, the punk haircut, and that tail—wasn't it really a bit much? How about Swallow-tailed Kite? (Beauty is as beauty does.) How about Scarlet-thighed Dacnis, or Red-capped Manakin, or any of a dozen iridescent hummingbirds? (Good things come in small packages.) How about Scarlet Tanager or Hooded Warbler? (Elegant local favorites.)

Five years later I got back to Costa Rica, and among the places I visited this time was a riverside lodge near the Cerro de la Muerte, southeast of San José. There were supposed to be quetzals around, but I went there on the recommendation (insistence, really) of a friend; she'd lived in San José for a while, and this was her favorite getaway: secluded, quiet, peaceful—and birdy.

That it was. Dawn the first morning brought nice finds: Long-tailed Silky-flycatcher, Spangle-cheeked Tanager, Sulfur-winged Parakeet, Ruddy-capped Nightingale-Thrush, Yellow-winged Vireo, and lots more. And, feeding in some sort of fruit tree near the cabins, a rather ratty, shortish-tailed male quetzal.

Aha—more proof that this bird is highly overrated, I expostulated. Note the dull greenish plumage and the generally shaggy appearance. Observe, if you will . . .

Well, I never got to finish that thought. As the first rays of the sun broke behind me, there appeared what must have been the Supreme High Commandant Quetzal of the Mountain of Death, swooping in to displace the youngster, who thought of resisting for about a millisecond and then fled for his life. The second bird's glittering-green tail-covert plumes arrived a minute or two later, streaming along behind like his own personal parade.

Green? Did I say green? Good Lord, forgive me: this creature was painted with crushed emeralds, tinged with pure molten gold. Red? Its belly was like the distilled blood of ten thousand Mayan sacrifices, the red-beyond-red of the sun being born. When the light shone through its headdress-crest, it glowed a color for which there is no English word, a color that, as far as I have seen, no film can capture. I wish I could provide a more detailed description, but I passed out from sheer tachycardiac shock.

So let this serve as my apology to every quetzal in every cloud forest from Mexico to Panama. I'm sorry I ever doubted it; you're the champ. If I were to pick an animal to worship, for my ancestors to be reincarnated as, to slaughter my enemies joyously for, you'd definitely be it.

And, the wonderful thing about birding is that the field guides are full of more dreambirds—not exactly as beautiful as a quetzal, maybe, but close. African sunbirds, Andean hummers, Australian parrots, and those birds-of-paradise I hope to get to someday. . . . They're all possibilities, no matter how remote, and they'll all bring many happy hours of hopes and fancies.

In the future, that is. For right now, I *absolutely must* find a Juan Fernández Tit-Tyrant. ■

In the Field

MOB SCENES

by Jack Connor

What happens when the tables get turned

"The kamikazes are back again," a couple in Ocean City, New Jersey, reports to me each June. "We can't walk the dog down the street, our cat won't come out from under the porch, and the little old lady next door is hiding in her house."

I try hard not to laugh. My friends have mixed feelings about birds, and the "kamikazes" are a resident pair of mockingbirds who defend the area around their nest by mobbing all two-legged and four-legged intruders for weeks.

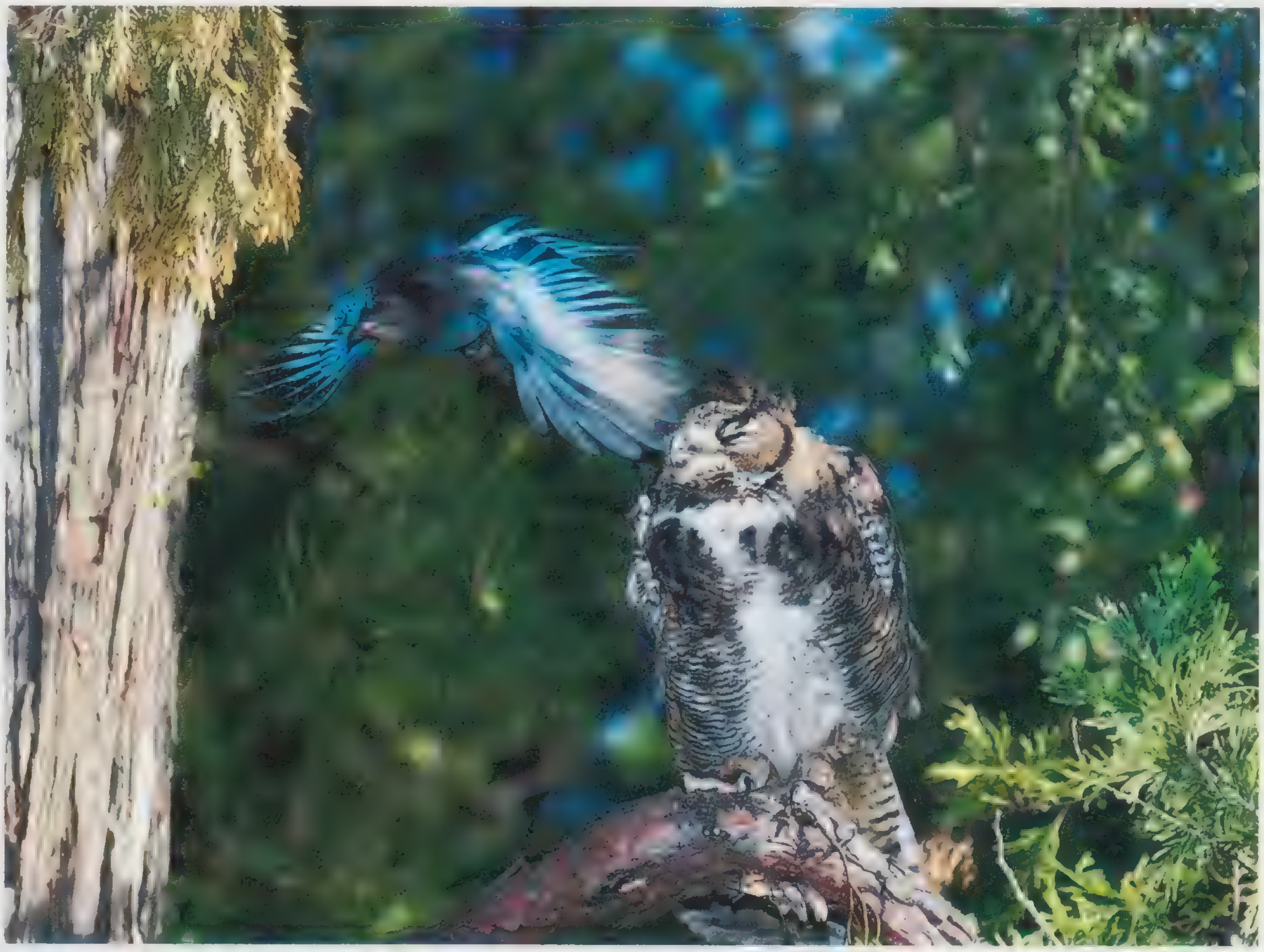
"Don't you think the cat will catch them eventually?" the husband asks, trying hard not to sound hopeful.

Textbooks on animal behavior and sociobiology often cite mobbing as a classic example of the power of "selfish genes." A mobber swooping on a predator may seem to be acting against its own best interests, because it is risking its life to protect others, but actually no true altruism is involved. From the gene's point of view, wounds or death can be a price worth paying—as long as the birds protected by the mobber share a close genetic relationship with it. In giving up its life to preserve its kin, a mobber can help preserve other copies of its own genes in the population. In a sense, then, the genes that lead the mobber to attack are acting selfishly, leading one individual to risk wounds or death so that other individuals with the same genes may be saved.

Behavior watchers will notice that the self-preservation aspects of mobbing are even more evident in the field than most textbook descriptions suggest. For one thing, mobbers are not as suicidal as they may seem at first glance. Watch carefully as a mockingbird attacks a cat or as a flock of jays mobs an owl, and you will see intelligence and wariness in each foray. Mockingbirds swoop closest only when a cat is walking away. Sometimes they even peck at its back as it tries to escape. If the cat rolls over to defend itself with its claws, however, they pull out of their swoops much higher, two or three feet out of reach, or they retreat to a nearby branch. They'll wait until the cat rolls over again before resuming their all-out attack.

Other mobbers are just as careful. While mobbing owls and hawks, jays generally stay near the protection of trees and other vegetation. They move close to their target only when it is perched. This strategy takes advantage of the inability of most raptors to strike quickly from a perched position. If the hawk or owl flies, the jays follow, calling loudly, but they trail at a safe distance, 10 or 15 feet or so behind the raptor, and again they usually stay close to trees or other protection. They seldom, if ever, follow a raptor over a treeless field. Jays are slow fliers and would be risking retaliation out in open space where a predator might be able to use its speed and strength to advantage.

European Starlings attack hawks in the open, but they are faster flyers



JOHN HENDRICKSON

This daredevil Steller's Jay knows that Great Horned Owls can't strike quickly when perched.

than jays, and they mob in flocks so tightly coordinated they seem to be operated by a single brain. At New Jersey's Cape May Point the resident starlings mob migrating hawks regularly. In flocks of 30, 40, or even 100 birds they swoop on the raptors from above, moving together as if they are interconnected parts of a giant beast. The hawks can only zig and zag, trying to escape the multi-headed, multi-beaked intimidator.

Even kingbirds, the most celebrated of solo mobbers, who attack buteos and eagles and (according to birders' legends, at least) even fly up at low-flying aircraft, don't qualify as kamikazes in my opinion. Yes, I've seen kingbirds land on the backs of Red-tailed Hawks and peck at their heads, and I've seen them pursue eagles until both birds were far out of sight. But I haven't seem them attack Merlins or Peregrine Falcons, the most aerodynamically gifted of bird eaters. Have any readers?

In my experience, mobbers are always careful, and I have never seen a mobbee turn the tables on a mobber, although a friend of mine did. One winter day at New Jersey's Island Beach State Park he spotted a Snowy Owl perched on a sand dune being mobbed by crows. Cawing and snapping, the crows swooped and circled the owl for many minutes. Meanwhile, the owl sat motionless, as if half-asleep, blinking occasionally. The crows swirled nearer and nearer, apparently agitated by their inability to drive the bird into flight. Finally, a couple of crows landed on the sand a foot or two in front of the owl, cawing loudly. A moment later one of them stepped even closer, and then, so quickly my friend wasn't sure how it happened, the owl pounced—snatching the crow with its huge talons. While the flock circled and cawed, the owl broke the crow's neck, plucked some feathers, and ate it.

I wonder if the crow was fooled by the owl's identity. All other New Jersey owls hunt between dusk and dawn. Snowy Owls are adapted to the 24-hour daylight of the Arctic summer, however, and see well even in bright sunshine. They are also rare so far south. The miscalculating crow may never have encountered a Snowy Owl before, and so fatally underestimated the owl's ability to retaliate.

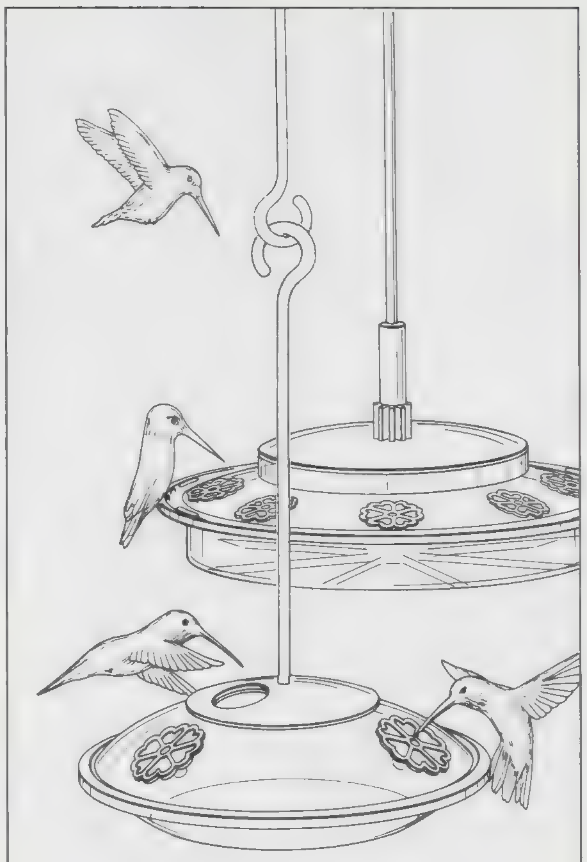
I'd be interested to hear from any readers who have seen mobbers lose their lives in a mobbing action. I'd also like to hear from those of you with other mobbing tales to tell.

The saddest and strangest mobbing event I have ever witnessed occurred one August afternoon 15 years ago on a road along a salt marsh not far from home. An odd white bird flew in over my head, pursued by three or four Tree Swallows, and landed on a telephone line. As the mobbers swirled around their target, chirping and swooping at it, I focused my binoculars and saw that its feathers had a sickly look, the color of stale vanilla ice cream. It was an albino Tree Swallow, probably born that summer and trying to make its first migration. Naturally, its instincts were to stay with the flock as they headed south; and just as naturally, the instincts of the rest of the flock were to drive away this stranger, this weird-looking intruder. As the albino perched on the line, the number of attackers grew from half a dozen to two or three dozen. One after another swooped so close they almost hit the bird. The albino did nothing but flinch and duck, and soon the mobbers were hitting it—pecking so hard the victim's feathers lifted up. When it flew weakly from the line, the attackers went into a frenzy, bumping the bird in the air and driving it downward into a bayberry bush. Here it squatted while the mob resumed their swooping attacks. After 20 minutes I couldn't bear to watch any longer and walked away. I doubt the bird made it to the wintering grounds, and I have not seen another albino swallow in the years since.

More often, watching mobbers makes me feel good about birds. Mobbing suggests an alertness, intelligence, confidence, and strength difficult to witness in other animals.

"Tell us what to do," my Ocean City friends plead every summer. "It's like an Alfred Hitchcock movie over here."

"You can't do anything," I tell them, "but accept your fate. For the next four or five weeks, those birds will rule your street." ■



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A SONG *of* THEIR OWN

BY DON KROODSMA

The nonconformist chickadees of Martha's Vineyard

11 May 1994; Martha's Vineyard, Massachusetts: *A blue-and-white squad car races around the curve and immediately brakes to a crawl 100 feet behind me. Glancing into the tiny mirror on my bicycle helmet I see the policeman eyeing me suspiciously. He can certainly see the long barrel slung menacingly across my shoulder. I continue riding my bicycle at a slow, safe pace as the squad car shadows my movements, matching my speed exactly. A second police car suddenly falls in line behind the first. I look ahead, half expecting to see the lane fill with dozens more squad cars, screeching to a halt as they corner me. I can see the morning paper now: "Armed and dangerous cyclist apprehended after terrorizing Martha's Vineyard residents from Gay Head to Edgartown."*

The headlights of the first car flash. I get the message: pull over, or else. I oblige, choosing to avoid the "or else." I keep my hands well out in the open as the policeman exits his vehicle and moves cautiously toward me. "Good morning, officer," I say, in my friendliest voice. "Yes, I know this thing looks like a shotgun . . . no, it's not a real gun, but it's called a shotgun microphone because it looks like a hefty gun barrel. I'm using it to record chickadees." His quizzical look conveys his best "It takes all kinds" response. At that point, he waves his backup on, confident that he can easily handle this one on his own.

Though my close encounter with the local law enforcement took place late in the morning, I'd already been up since well before dawn. I had parked my car at the airport and headed out into the darkness on my bicycle, listening for singing chickadees. The warming eastern sky and windless conditions promised a perfect day for recording. When I heard the first whistles at 4:46 A.M., my shotgun mike was aimed and the tape was rolling. I knew the singing would be fast and furious for about an hour, and I wanted to record as many chickadees as possible.

My plan was to circle the heart of Martha's Vineyard—an island off the coast of Massachusetts—to document the unusual singing behavior of the local chickadees. My recording

Author Don Kroodsma, at right, struck fear into the hearts of Martha's Vineyard residents as he bicycled around the island, recording the area's unique chickadee songs with his shotgun microphone and tape recorder.

PAULA LERNER

PETER SIMON

excursion was interrupted temporarily by the police, but after a good chuckle with the officer, I continued on my way. By then it was getting late in the morning, however, and most of the chickadees were finished singing. And, besides, I had to catch the ferry back to the mainland. But what I had heard on the island really intrigued me, and I was eager to get back to my sound spectrum analyzer so that I could "see" what I had heard.

Why was I so interested in Black-capped Chickadees? After all, this species occurs across the continent, from New Jersey to Alaska and from California to Newfoundland. Actually, the birds' broad geographic range and the similarity of how they sing over that range is exactly what makes them so fascinating. And because chickadee songs are so recognizable and easy to hear, we can all enjoy them if we just know how to listen.

Pick any Black-capped Chickadee in North America and listen closely to the male as he sings. Most likely you'll hear two whistles, each a little less than a half-second long, with the first whistle on a higher pitch than the second. Peterson's field guide describes this sound as the *fee-bee* or *fee-bee-ee* song. I prefer to call it their *hey-sweetie* song. The *fee-bee* rendition doesn't seem quite accurate, because if you listen carefully to a male singing nearby, you'll invariably hear a slight hesitation in the second whistle; hence, the two syllables of *bee-ee* or *sweetie* are more appropriate.

Now take another step with your listening. Go to a chickadee's territory about 45 minutes before sunrise. Concentrate as he starts singing. You'll quickly get used to his whistles—all precisely repeated on the same pitch—and then you'll be jolted as the male shifts his *hey-sweetie* to a different pitch, either higher or lower than before. Perhaps he sang the *hey* at a frequency of about 4,000 cycles per second—about the rate at which the thin wires of the highest C on a piano vibrate. The *hey* in the next series of songs might drop to 3,500 cycles per second—a shift of about a quarter of an octave, which anyone can hear. During their 30 to 60 minutes of exuberant singing at dawn, the birds frequently shift the pitch of their songs. Although they have one basic *hey-sweetie* song, they sing it over a considerable range of frequencies.

LANG ELLIOTT

Martha's Vineyard chickadees are fascinating—their songs are different from the songs of Black-capped Chickadees in other areas of the continent.

What I find so astounding about this species is that males from across North America almost all sing the same basic tune. I've listened to numerous chickadee recordings at the Lab of Ornithology's Library of Natural Sounds (LNS)—recordings made in Maine, New Brunswick, New York, Ontario, New Jersey, Pennsylvania, Tennessee, Michigan, Utah, Alberta, and British Columbia—and all the birds produced the same whistled *hey-sweetie* song. How do these chickadees achieve such uniformity? We all know that a story told to a succession of friends will gradually be transformed as it is retold. Because young chickadees learn their

"I did it my way." A Martha's Vineyard chickadee, above, belts out his unique rendition of the chickadee whistle. At left, picturesque Gay Head, one of Kroodsma's recording sites on the island.

BHL

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hey-sweetie song from adults, you might expect some "copy errors" to take place from generation to generation, eventually altering the song. But over most of their North American range, and probably over countless generations, the *hey-sweetie* has remained remarkably consistent.

STEVEN D. FACCIO (2)

Chickadees weren't supposed to behave like this. Hadn't they read the books? They aren't supposed to have dialects in their whistled songs.

We don't expect this kind of consistency from songbirds. As young songbirds practice their songs, they babble, much like young children learning to speak. This learning process typically produces dialects in songs, similar to the regional dialects in human speech, because young birds learn the local songs where they settle to breed. In the coastal chaparral of California, the song dialects of White-crowned Sparrows change every few miles. And neighborhoods of territorial Indigo Buntings, Song Sparrows, and Northern Cardinals can also be identified by their unique songs. Unlike the consistent *hey-sweetie* whistles of these chickadees, the songs of most songbirds vary markedly from place to place.

But this is where the Martha's Vineyard chickadees become so fascinating—their songs are different from the songs of Black-capped Chickadees in other areas of the continent. Unlike the chickadees a few miles away on the mainland, which sing the first whistle of their *hey-sweetie* song on a higher pitch than the second, the birds on the island sing both parts of the song on the same pitch. Perhaps, I thought, these errant chickadees on Martha's Vineyard could help us to understand the uniformity of their mainland cousins' songs. An exception to an apparent rule often provides an excellent opportunity to probe the deeper layers within rules.

William Brewster first noted the odd Martha's Vineyard chickadee song in 1891, and Aaron Bagg later described it in detail in *Massachusetts Audubon* magazine in 1958. These descriptions of the birds' odd songs are what originally piqued my interest. During the fall of 1993, I visited the Lab of Ornithology and listened to some chickadee songs recorded by Dolly Minis, a longtime LNS associate who had been recording on Martha's Vineyard since the 1970s. Her tapes confirmed Brewster's and

Bagg's descriptions—both parts of the whistles were sung on the same pitch—but something was drastically wrong. These songs were backwards, a *sweetie-hey*, with the hesitation in the first, not the second, whistle. I knew then that I would have to visit Martha's Vineyard the next spring, so that I could experience these chickadees firsthand. And on that visit, in 1994, the chickadees continued to astound me. The morning before my encounter with the police, I recorded a chickadee who sang his *sweetie-hey* song on a low and a high frequency, but not in between. Unheard of! Didn't he know that he was supposed to slide his song up and down the scale, and not just pick one low and one high frequency to use? But more surprises were in store.

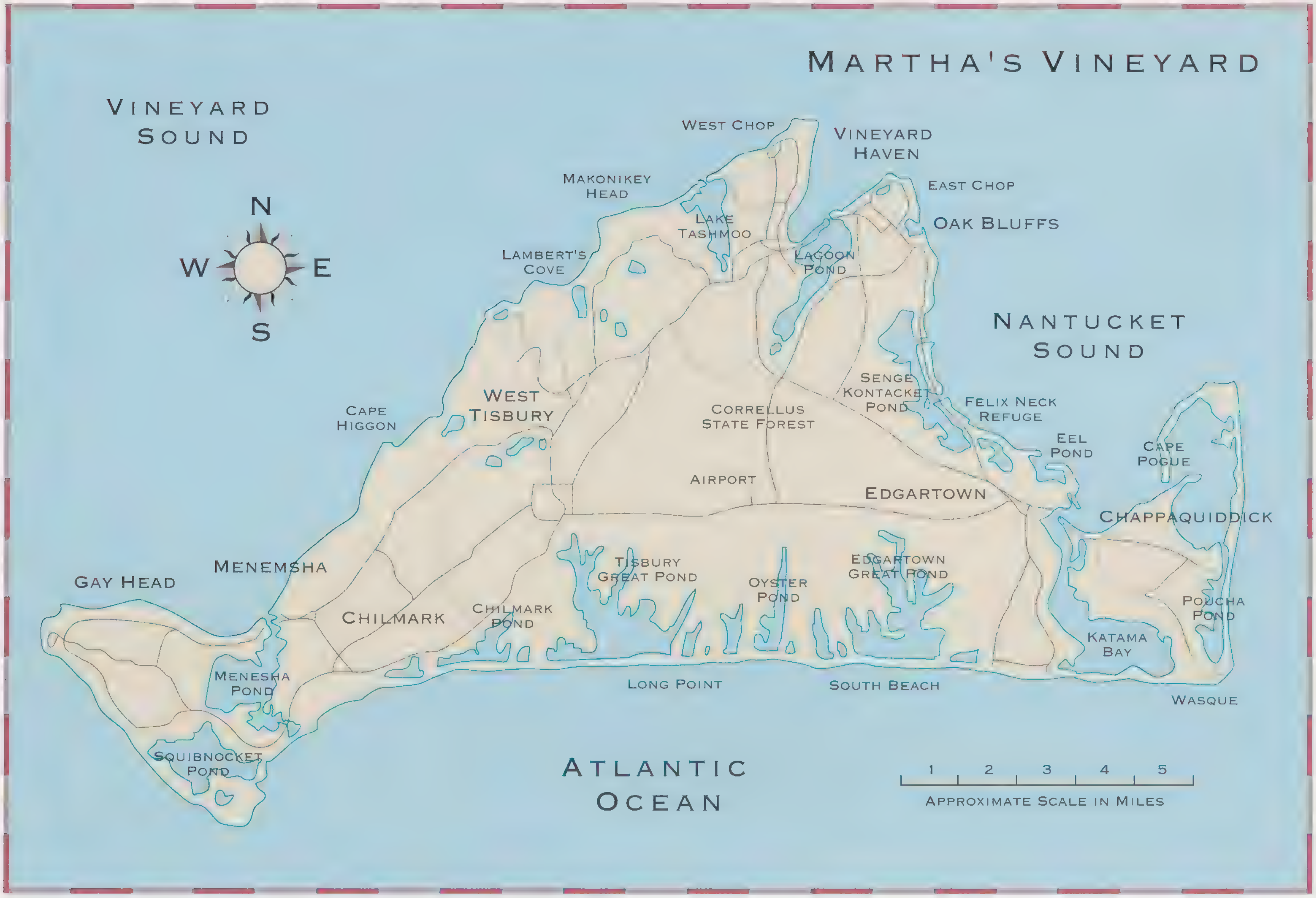
The next morning, as I rode my bike to Edgartown, I couldn't believe what I was hearing: males were singing on a high and a low frequency again, but the segments of the songs were different. The low-frequency song was the same *sweetie-hey* of the western part of Martha's Vineyard, but the high-frequency song was more complex, with two hesitations in the first whistle and one in the second (*swesweetie-sweetie*). By the time I reached Edgartown, on the far eastern end of the island, males were singing only this *swesweetie-sweetie*, on both a high and low frequency. Riding northeast, toward Vineyard Haven, I encountered the low-frequency *sweetie-hey* again, near Felix Neck refuge. But I did not hear the high-frequency *sweetie-hey* again until I was past Vineyard Haven, on Lambert's Cove Road.

I began to distrust my ears. Black-capped Chickadees weren't supposed to behave like this. Hadn't they read the books? They aren't supposed to have dialects in their whistled songs. And a repertoire of two different songs, which I heard throughout the center of the island, is simply unacceptable. Perhaps it was just as well that the police had intervened, because I was beginning to lose confidence in my ears.

Don Kroodsma's merry band of guerrilla chickadee recordists fanned out across Martha's Vineyard, from Gay's Head, page 12, to Edgartown, far left, to Vineyard Haven, above, and points in between, attempting to document the varied song styles of the island chickadees.

The following spring I invited several friends and colleagues to join me on the island to help record chickadees. I thought that with so many of us "working," we'd be bound to find answers quickly. The first person to sign up was Dolly Minis, an octogenarian with the enthusiasm of a youngster. Linda Macaulay, a Lab board member who travels the world recording for LNS, was also eager to join us. Next to enlist was Jan Ortiz, leader of Amherst's local bird club and nature center and a graduate of the LNS recording workshop. I was pleased to have these three excellent recordists with us; dedicated amateurs like Dolly, Linda, and Jan are so essential to many of the Lab of Ornithology's research endeavors. Rounding out our crew were chickadee expert Frank Gill of the National Audubon Society, writer Don Stap, Sylvia Halkin, a professor at Central Connecticut State University, and several graduate students or recent graduates from the University of Massachusetts at Amherst:

TOM PARKER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SENGEKONTACKET POND
FELIX NECK REFUGE
CAPE HIGGON
WEST TISBURY
CORRELLUS STATE FOREST
EEL POND
CAPE POGUE
AIRPORT
EDGARTOWN
CHAPPAQUIDDICK
MENEMSHA
GAY HEAD
TISBURY GREAT POND
OYSTER POND
EDGARTOWN GREAT POND
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KATAMA BAY
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SOUTH BEACH
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APPROXIMATE SCALE IN MILES

After their chickadee recording blitz on Martha's Vineyard, Kroodsma and company studied each song intently both by listening and by examining a visual image of the sound on a spectrum analyzer. They plotted each song variant on a map of the island, above. In all their recordings, the group found only one bird that sang the familiar whistle of mainland Black-capped Chickadees, far right.

Jeff Bolsinger, Bruce Byers, Peter Houlihan, and Curtis Marantz.

This time I dutifully warned local residents and law enforcement authorities of our impending invasion. In his weekly "All Outdoors" column in the *Vineyard Gazette,* legendary local birder Vernon Laux recounted my 1994 brush with the law and announced that "like Schwarzenegger in *The Terminator,* he's back, and this time with reinforcements."

For four mornings, we scoured the island for whistling chickadees. By 4:30 each morning we had scattered to distant points throughout the island: Chappaquiddick, Edgartown, Felix Neck refuge, Vineyard Haven, West Chop, Menemsha Hills, Manuel Correllus State Forest, Gay Head, and several nature preserves. Across the island, unbeknownst to the chickadees, their whistles were being collected—encoded magnetically on our tapes without harming the donors.

After each morning session, we reconvened in Gay Head and studied our recordings. We were aided by our spectrum analyzer, a sound analyzer that provided a picture of the sounds as we listened to them. By both seeing and hearing the sounds, we could focus on the details of each whistle. We studied song after song, plotting each variant on our map of Martha's Vineyard.

Slowly the chickadees began to yield their secrets. We found only one bird on the island singing the typical *hey-sweetie* of other Black-capped Chickadees. All the other birds sang the Martha's Vineyard monotone. The Gay Head birds seemed to sing *sweetie-hey* as both their high- and low-frequency songs. A small group of males in Edgartown sang *swesweetie-sweetie* on both the high and low frequency. Between these extremes, though, things got a little messy. Throughout the heart of the island, from Vineyard Haven to Felix Neck refuge in the north to Long Point refuge and Tisbury Great Pond in the south, chickadees favored the low *sweetie-hey* with a high frequency *swesweet-sweetie;* this high frequency song had one brief stutter at the beginning of the first whistle and one in the middle of the second whistle. Some neighborhoods seemed to favor other variations and combinations. Some birds violated all the rules; one sang a *sweet-sweet-sweet-sweet* as his high frequency song, a song with four discreet whistles, but no stutters within any of the whistles. After returning to Amherst, we would continue to graph and puzzle over the details of these songs and how birds on different parts of Martha's

Vineyard seem to whistle their own tunes.

Several features of the whistling chickadees on Martha's Vineyard are now very clear. Most obvious is the fact that the whistles are strikingly different from the *hey-sweetie* song of chickadees throughout North America. Second, Martha's Vineyard chickadees seem to have two song forms, one on a high and one on a low frequency, and, unlike mainland birds, they do not shift the frequency of their songs over a continuous range. Third, audibly different dialects occur on different parts of the island, but no such noticeable dialects occur over most of North America.

TOM VEZO

Oh, chickadees! We know so little about who you are and why you do what you do. You humble us, presenting us with so many mysteries and yielding your secrets so sparingly.

Previous laboratory studies of how Black-capped Chickadees develop their songs only intensify the intrigue. We had earlier raised some young chickadees from western Massachusetts and tried to teach them their *hey-sweetie* song. Because many species of songbirds readily learn their songs in the laboratory, we did not expect the young chickadees to have any trouble learning such a simple song. We were completely surprised by the results. Chickadees who were housed together learned each others' songs, and each developed multiple songs, so that each chickadee had two (or even three) different songs. And we found that birds in different rooms had different dialects. Our laboratory chickadees, which came from the mainland, were behaving like Martha's Vineyard birds. We reasoned that some kind of social influences among chickadees must be forcing them to conform to the *hey-sweetie* song throughout much of the continent, but these influences are apparently absent in the laboratory. Could they also be absent on Martha's Vineyard?

The Library of Natural Sounds held yet another surprise. Geoff Keller, an LNS associate on the West Coast, had recorded some Black-capped Chickadees in Oregon that sang *sweetie-sweetie-sweetie-sweetie,* all more or less on the same pitch. Then some friends in Seattle mentioned some odd chickadee songs that had been described in 1909 in Dawson and Bowles's *Birds of Washington.* And another publication I read mentioned chickadees in Alaska that might sing yet another variation. It seems that some pockets of western birds don't conform to the otherwise ubiquitous *hey-sweetie* song either. In those pockets, do males behave like Martha's Vineyard birds and have more than one song form, different high- and low-frequency songs, with no frequency shifting? My hunch is that they, too, have somehow escaped the social influences that encourage song uniformity over the rest of North America.

Oh, chickadees! Although my quests during the last year have taken me to Costa Rica, Peru, Venezuela, and the Falkland Islands, it is you backyard chickadees who intrigue me most. Who enforces the great uniformity in your songs across North America? How can you be so consistent over so many generations and over such a broad geographic expanse? How did your neighborhood dialects arise on Martha's Vineyard? Why do you whistle such simple songs? Why do you shift the pitch of your *hey-sweeties*? Are you simply trying to introduce some variety into an otherwise monotonous performance? And what does this variety accomplish? Who's listening, and what do they hear? We know so little about who you are and why you do what you do. You chickadees humble us, presenting us with so many mysteries and yielding your secrets so sparingly. ■

Don Kroodsma is a professor of biology at the University of Massachusetts at Amherst and a visiting fellow at the Cornell Laboratory of Ornithology.

SOL GOLDBERG

For decades, Ithaca birders have compiled a list of the week's sightings at Monday night seminars, held in the Cornell Lab of Ornithology's Fuertes Room (shown above in a 1960s photo). Lab-cofounder Arthur A. Allen, right, launched the custom; author Stanley A. Temple discovered that the simple lists contain valuable data.

THE CHECKLIST CONNECTION

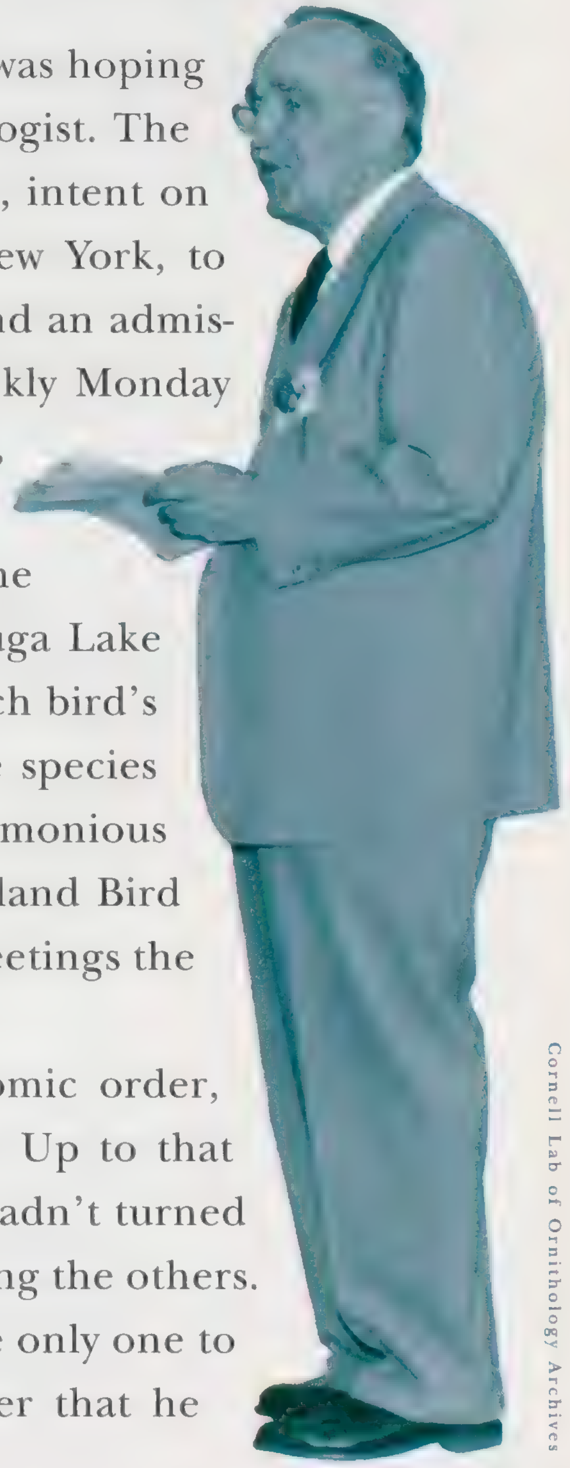
BY STANLEY A. TEMPLE

More than a pleasant souvenir of a day's birding, checklists are a treasure trove of scientific data

It was my first trip to Cornell University, and I was hoping to meet Arthur A. Allen, the famous ornithologist. The year was 1962, and I was a high school junior, intent on studying ornithology. I had come to Ithaca, New York, to check out Cornell's highly regarded program, and an admissions counselor suggested that I attend the weekly Monday night seminar at the Laboratory of Ornithology, where Allen was the co-director. I arrived early.

After Allen welcomed the group, he read "the list"—a checklist of the birds found in the Cayuga Lake Basin, the region around Ithaca. As he called each bird's name, members of the group who had seen the species during the previous week replied "yes" in a disharmonious chorus. I was familiar with this routine; the Kirtland Bird Club back home in Cleveland, Ohio, began its meetings the same way.

Allen read the names of the birds in taxonomic order, starting with loons. Soon he got to the raptors. Up to that point my three days of casual birding in Ithaca hadn't turned up anything unusual, so my "yeses" were lost among the others. Then Allen called out "Cooper's Hawk." I was the only one to respond—with an enthusiastic "yes." I remember that he



Cornell Lab of Ornithology Archives

BHL

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looked up and momentarily eyed the unfamiliar teenager in the front row. Afterward, when I introduced myself, he asked about my sighting. It was my first and only conversation with the Lab's famous founder, but at least I'd made the hoped-for good impression.

A year and a half later I was a freshman at Cornell. Allen had died, but his Monday night seminars at the Lab continued, and so did the reading of the list. I attended the Monday night seminars regularly, and over the next eight years I must have replied "yes" thousands of times.

COURTESY OF STANLEY A. TEMPLE

When some seminar participants suggested that "reading the list" was a waste of time, Temple, shown here visiting a Peregrine Falcon nest in 1968, objected. As a Cornell graduate student, he demonstrated that the lists could be used to document such population trends as the pesticide-induced decline of the Cooper's Hawk, far right.

By 1970 I was a Ph.D. student at the Lab, and the Monday night seminars were more popular than ever. The new Fuertes Room, its walls lined with the works of bird artist Louis Agassiz Fuertes, provided a spacious and elegant setting for the now more formal proceedings. In keeping with this new image, several influential seminar participants, including some members of the Lab's staff, suggested streamlining the seminar by abandoning the reading of the checklist. They berated the practice as an arcane and useless exercise that bored most attendees, who came primarily to hear the featured speakers.

I was one of those who disagreed. I enjoyed the tradition and the opportunity for audience participation, and I believed, without knowing specifically why, that reading the list was a worthwhile activity. Then I learned from Sally Spofford, a long-time Lab employee, that ever since Allen had started the tradition in the 1920s the weekly checklists had been dutifully filed away. Years and years of continuous data existed, but they had rarely been used, except to document a few unusual sightings. It seemed to me that these records *must* contain interesting information on seasonal and year-to-year changes in bird populations. I decided to find out if my intuition about the value of checklists was correct.

I started by searching the ornithological literature, but I found little useful information on checklists. I did note that Joe Hickey, author of the classic *Guide to Birdwatching*, had been an early advocate of keeping checklist records. He was a member of the Lab's administrative board at the time, so I sought his advice.

Hickey agreed that there was potentially valuable information in the weekly seminar lists—and in *all* the checklists that birders kept. But so far no one had made good use of the information. He encouraged me to pursue the issue.

I knew the Lab's long string of checklists represented a rare collection. Checklists hardly ever get compiled in a systematic way—usually, they remain scattered among birders. And many birders discard their checklists after reviewing them to see what they reveal about the success of the day's birding venture.

I gathered up all the Lab's checklists through 1971 and took stock of what I had to work with. At best it was a messy data set. The number of checklists varied among years; there was no indication of how many observers had contributed to each list; and Allen had made only a simple check mark next to each species sighted, with no indication of how many individual birds had been seen. At least there were a few constants: each checklist always covered a single week during the academic year (September through May), and the bird sightings were confined to the Cayuga Lake Basin.

Whatever I did with all the musty, yellowed lists would have to be simple. I decided to use my newly acquired computer skills (and my major professor's computer account) to produce the simplest of statistics for each species: the "reporting frequency," or the percentage of weekly checklists per year on which the species had been recorded.

As I expected, some common birds were reported on 100 percent of the checklists; other, less-common birds were reported at lower frequencies. For example, in 1962, my Cooper's Hawk report was one of only seven over the entire year. The reporting frequencies also varied from year to year for many species, and when I graphed these results, I saw some intriguing patterns. Over the 35-year span of the records, the reporting frequencies for some species remained stable; others increased, decreased, or fluctuated.

Did these patterns make any sense? When I compared them with other records of how bird populations had changed over time, such as Christmas Bird Counts or long-term studies of particular species, I saw that they clearly reflected real changes. For example, birders in the Cayuga Lake Basin reported Cooper's Hawks commonly until after 1950, when this species experienced a steady decline in numbers and became a regional rarity. The checklist records accurately documented the raptor's pesticide-induced decline. Species such as Red-bellied Woodpecker, Tufted Titmouse, and Northern Cardinal were expanding their ranges northward into the Cayuga Lake Basin during the checklist period, and the lists charted the arrival and establishment of these birds. The records also accurately tracked periodic fluctuations in populations of Snowy Owls, Rough-legged Hawks, and Northern Shrikes—species that move southward when their prey in the Arctic is in short supply.

I presented the results of my checklist analyses both at a Monday night seminar and at an annual meeting of the American Ornithologists' Union. That silenced the critics, and the traditional Monday night reading of the list won a reprieve. But I also accomplished something more important. The analysis of checklist records became an acknowledged way to monitor bird population trends, and I found that other ornithologists shared my interest in using checklist records.

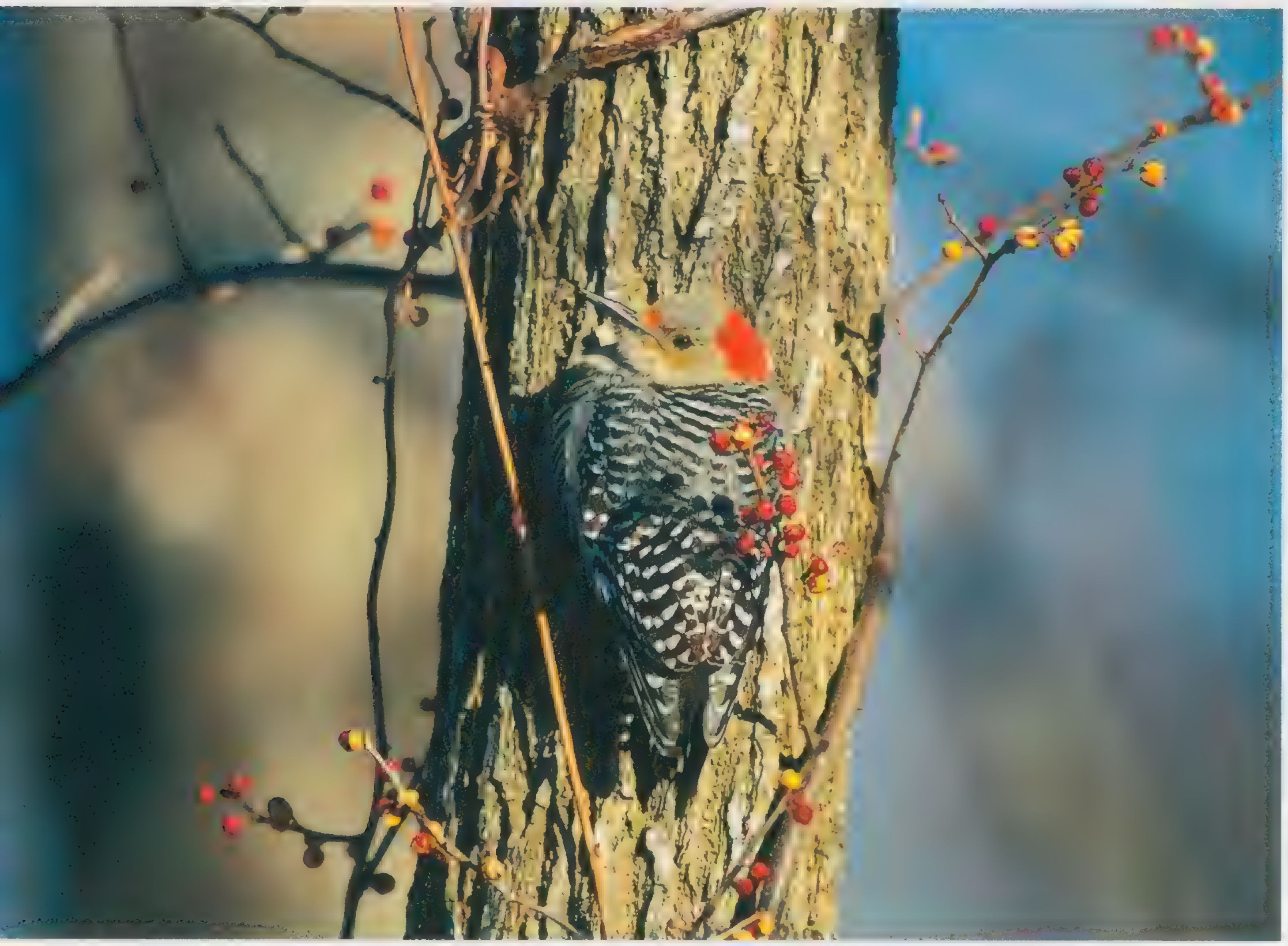
HUGH P. SMITH, JR.

Birders in the Cayuga Lake Basin reported Cooper's Hawks commonly until after 1950, when this species declined in numbers and became a regional rarity.

I remained intrigued with the idea of analyzing checklist records, and when I became a professor at the University of Wisconsin (replacing Joe Hickey, who had retired), I decided to pursue my checklist ideas further. Enlisting the help of the 1,200-member Wisconsin Society for Ornithology (WSO), I designed a more sophisticated checklist scheme that overcame many of the deficiencies of the Cornell lists and launched the Wisconsin Checklist Project in 1982.

Several features made the Wisconsin Checklist Project better than previous attempts to collect and analyze checklist records. Instead of pooling their sightings in a single list, individual birders recorded their own weekly records, thus increasing the sample size. The participants also recorded their observations on special machine-scannable forms, making it easy to process and analyze thousands of forms. Finally, participants recorded the location in Wisconsin where they made each observation, thus providing geographical as well as seasonal information.

The computer forms were an instant success with Wisconsin birders. Nearly a third of the WSO members began the weekly routine of filling in "bubbles" on the forms, indicating which birds they'd seen. Over the course of five years, they submitted more than 22,000 forms. I analyzed these data and published the results regularly in the state bird journal, *The Passenger Pigeon.* These articles pleased both birders and researchers. Birders were thrilled to see the results of their birding efforts being used to address interesting questions about birds, and researchers were excited to have new quantitative data describing temporal and spatial variations in bird abundances.



Temple found that Arthur Allen's old Monday night lists also tracked the northward movements of such southern species as the Red-bellied Woodpecker, above, Tufted Titmouse, and Northern Cardinal. Today birders who keep checklists, far right, can contribute to several bird research programs, including Temple's Wisconsin Checklist Project.

In 1987 I published a book about the first five years of the project. *Wisconsin Birds: A Seasonal and Geographical Guide* presents the project's results in a simple graphical format that is useful to birders. By consulting the guide, for example, a birder can discover the relative likelihood of seeing a species in Wisconsin during a typical year and also find out how the probability of seeing the species varies from county to county and from week to week throughout the year. Reactions to the guide from Wisconsin's birding community were enthusiastic.

Today, the Wisconsin Checklist Project continues under the management of the Wisconsin Department of Natural Resources, which has adopted it as the preferred way to monitor bird populations in the state. The rapidly accumulating data have also allowed us to test more rigorously how well the checklist records compare with conventional methods of monitoring bird populations. We have found very strong correlations between the results of the checklist project and Christmas Bird Counts, Breeding Bird Surveys, and various migration counts.

In fact checklists are better than these other techniques in some ways. Checklists provide year-round information, not just snapshots. Data collection takes place weekly throughout the year, rather than being confined to a single day or a few days once a year, when weather conditions or other factors can influence the level of participation and the results. But most importantly, checklists are convenient. Birders don't have to go out of their way to collect data; they merely record the results of their normal birding activities.

In the end, the urge to defend a Cornell tradition has led to the development of an important research tool. Interest in checklist data has grown, and several other major programs are underway. One of the oldest is Canada's EPOQ (Etude des Populations d'Oiseaux du Quebec) program, which has now accumulated over 160,000 checklists from birders. On the other side of the globe in southwestern Australia, checklist records have been combined with a traditional bird atlas project to produce detailed calendars and maps for the region's avifauna. The success of these programs is an indication of how important simple checklist records can be, if they are compiled and analyzed.

Joe Hickey was perceptive in encouraging birders to keep track of their birding activities, and Arthur Allen was far-sighted in maintaining the Cornell records for subsequent analyses. Listless birding is a loss to science; birders who do not keep at least a simple checklist record are depriving researchers of valuable information about the status of bird populations. Your checklist is more than a pleasant reminder of a birding trip; handled properly, it can also make a simple but significant contribution to the science of ornithology. ■

Stan Temple is the Beers-Bascom Professor in Conservation at the University of Wisconsin's Department of Wildlife Ecology. A quintessential Cornellian, he holds three degrees from Cornell University and maintains ties with his alma mater by serving on the Lab's administrative board.

ALL ABOUT CHECKLISTS

The question sounds simple enough: "What *is* a checklist, anyway?" But the answer is pretty complicated—the term "checklist" has been applied to a variety of types of publications.

In its simplest form, a checklist is a printed list of the birds found in a particular region, with a space in front of each species that you can check off when you have seen the bird. The most complicated checklists are "annotated"—they include not only a list of birds, but information on each species' status and distribution. One well-known annotated checklist is *The Checklist of North American Birds* by the American Ornithologists' Union (6th edition, 1983).

So a checklist can be a reference book (like most of the annotated checklists) or a simple card or pamphlet that you can take along in the field. Many birders collect unused checklists as mementos of their birding trips (and also as valuable sources of information on bird distribution). Others fill out a checklist every time they go birding.

By routinely filling out checklists, birders can create a gold mine of historical information on changes in birds' distribution and abundance. For example, a recent article in the *Journal of Field Ornithology* ("Timing of Migration and Status of Vireos (Vireonidae) in Louisiana," by J. V. Remsen, Jr., Steven W. Cardiff, and Donna Dittmann) is based on checklists and related field notes kept by the authors and their friends over the past 20 years.

Even a field card can include an incredible amount of information, such as abundance, seasonal occurrence, and habitat preferences. This information is usually presented in codes. For example, in the *Check List of Birds of El Paso County, Colorado,* by Ben and Sally Sorensen, the code "f GL AG" in the "Loggerhead Shrike" row under the "Spring" column means the bird is fairly common in grassland and agricultural habitats. In the October 1993 issue of *Birding* magazine, birder Larry Allen issued a plea to checklist authors, asking for consistency in the codes. Birders are free-thinking types, however, so check the code definitions printed on each checklist.

Consider filling out a checklist every day you go birding—or at least for some of your most frequent birding destinations. You can pick up checklists for most parks and wildlife refuges at their headquarters. The American Birding Association (ABA) sells state, regional, national, and world checklists and the ABA/Lane *Birder's Guides,* which contain directions to birding spots as well as checklists. Call (800) 634-7736 to request a free *ABA Sales* catalog. The Lab's Crow's Nest Birding Shop also carries ABA/Lane *Birders Guides:* call (607) 254-2400 for information. Finally, checklists are sometimes available at bookstores that specialize in bird books.

Because of the demonstrated successes of the Cornell, Wisconsin, and Quebec checklist projects, government agencies and nongovernmental organizations in the United States and Canada are considering developing statewide or continentwide checklist projects. The Migration Monitoring Council—composed of representatives from the National Biological Service, U.S. Forest Service, and Canadian Wildlife Service, and various bird observatories—has established an Extensive Monitoring Technical Committee to consider the best way to organize such a checklist project. Canadian biologist and Project FeederWatch founder Erica H. Dunn has summarized the committee's recommendations in a document entitled, "Recommended Methods for Regional Checklist Programs." To request a copy, write to Greg Butcher, ABA, P.O. Box 6599, Colorado Springs, Colorado 80934, or Erica H. Dunn, Canadian Wildlife Service, National Wildlife Research Centre, 100 Gamelin Boulevard, Hull, Quebec, Canada, K1A 0H3.

TOM VEZO (2)

I am working on a proposal for a checklist program to study the importance of certain landbird migratory stopover sites in North America. I plan to promote a simple, standardized method to record migrants both in spring and fall. The data will be used to identify the most important stopover sites and to create informative maps about the timing and geography of bird migration. I hope that many of you will send in data to help us paint a picture of North American bird migration. — *Greg Butcher*

Greg Butcher is the executive director of the American Birding Association, a nonprofit membership organization that serves North American birders and promotes the future of birds and birding. He is the former director of the Lab's Bird Population Studies program.

BIRDING BY MODEM

BY SANDRA L. SHERMAN

A guided tour through the Internet

When Francisco Valdes of Torreon, Mexico, heard that his local newspaper had published an article advocating killing a Peregrine Falcon that was preying on the town's Rock Doves, he immediately called the editors. "I told them that, unlike pigeons, the Peregrine Falcon is a protected species, that it is a rare and magnificent bird, and that we should be proud that the bird is wintering in Torreon," he said. "I also urged them to run a retraction, which I volunteered to help them write."

Met with rudeness and a premature dial tone, Valdes got upset . . . then he got even. He posted a message about the incident on BirdChat, an electronic mailing list on the Internet, then sat back and waited. In a short time, the newspaper was deluged with faxes and letters defending the falcon. "I guess the editors were quite surprised by all these faxes arriving from the United States and Canada overnight," Valdes said. "They ran a correction after all."

This call to arms illustrates the power of the Internet: it spans thousands of miles, is oblivious to borders, and unites people through the camaraderie of a common cause. Just what is the Internet? In case you've spent the past decade wandering in the Peruvian jungles and haven't heard, the Internet is a massive, largely unstructured collection of millions of interconnected computers that relay data and provide services. The computers—owned by governments, organizations, corporations, universities, and

ILLUSTRATIONS BY STEVE CARVER

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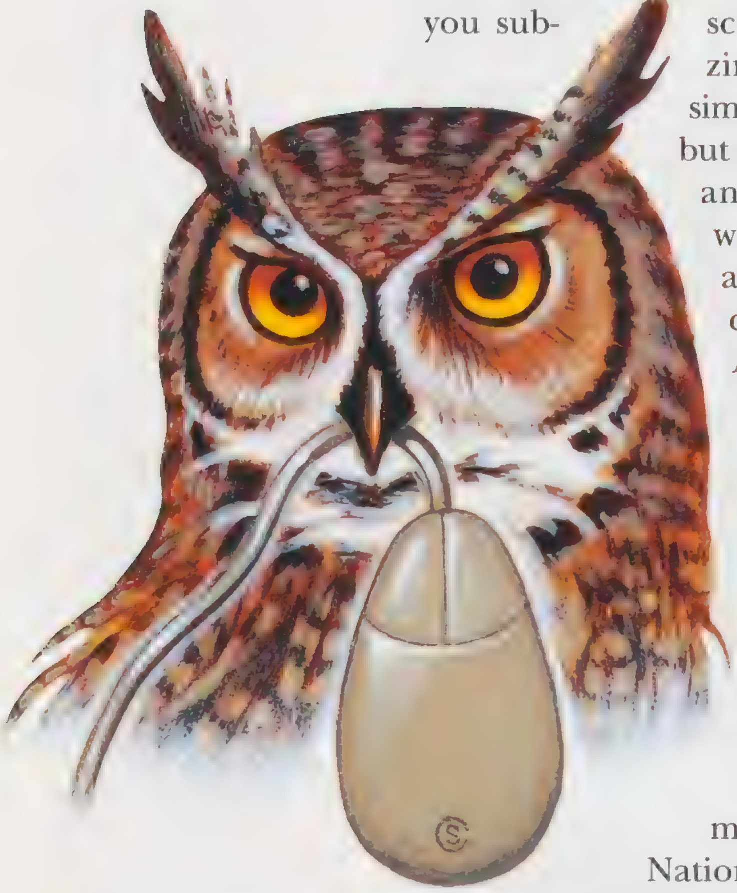
private individuals—are connected via telephone lines, using an inexpensive electronic device called a modem. Using the Internet to connect birders throughout the world has altered the way people gather and disseminate birding information. It is perhaps as significant a step forward as the publication of Roger Tory Peterson's first field guide.

Online communications can be broken into roughly five types: electronic mail (called e-mail), for sending messages back and forth to friends and other contacts; dial-up bulletin board services, which are not part of the Internet; electronic mailing lists, to which you subscribe as you would to a magazine; newsgroups, which are similar to electronic mailing lists but don't require subscriptions; and the World Wide Web, which I'll explain later in this article. In addition, online commercial services such as America Online, Prodigy, and CompuServe have their own birding forums and provide access to the Internet.



E-mail can connect you with individuals or organizations. You might send an e-mail message to a friend giving details of the pelagic birding trip you took last weekend. You might send a message to the National Audubon Society or The Nature Conservancy to comment on their agendas. You might send e-mail to your senator, representative, or even the President of the United States to influence their stands on particular issues. Or you might take part in a project tracking the number and species of roadkill birds seen from mid-March to May (Brewster Bartlett, aka Dr. Splatt, can be reached at BBartlett@vmsvax. simmons.edu).

Electronic mailing lists may be national/international, like BirdChat, or statewide/local. These discussion lists address questions about sightings, identification, distribution, bird behavior, and dozens of other topics. Rob Scott, associate director of public affairs at the Cornell Lab of Ornithology, runs a local list (Cayugabirds-L) and a list for New York State (NYSBirds-L). According to Scott, these electronic mailing lists not only tell you the best locations to find birds, they can also tell you where not to bird. For example, in June 1994 Cayugabirds-L gave directions to a stretch of abandoned railroad bed near Watkins Glen, New York, where several warbler species were breeding. "Five days after the directions were posted, someone went out there and was chased by a female bear with a cub," said Scott. "A new notice was posted to warn birders about going there."

State-based birding lists also exist for California, Washington, Oregon, Minnesota, and other areas. Norm Saunders's The Osprey's Nest, a bulletin-board system for Washington, D.C., and the surrounding states, may be the mother of all computer-based birding resources, in operation since July 1987. But by far the most successful set of e-mailing lists is the National Birding Hotline Cooperative (NBHC). Run by list-owner Chuck Williamson of Tucson, Arizona, the NBHC evolved about six years ago as an exchange between The Osprey's Nest and a birding bulletin-board service that Williamson ran from the University of Arizona. People who transcribe rare-bird alerts started using it to trade information.

A newsgroup called rec.birds also existed at that time and provided a forum for bird discussions, some of which turned into heated arguments. Williamson wanted to avoid some of the animosity he saw cropping up on rec.birds, so he attempted to keep chatty messages off the NBHC. But the users had other ideas, and interesting discussions continued to crop up. Williamson finally acquiesced, and thus was born BirdChat. If you'd like to subscribe to this group, send an e-mail message—"Subscribe BirdChat" and your name—to LISTSERV@LISTSERV.ARIZONA.EDU.

Regional rare-bird alerts, such as BirdEast, BirdWest, and BirdCentral, were also formed, and they've become a great boon to birders, not only providing up-to-the-minute lists of interesting species, but also complete directions to the locations, which you can print out instead of having to scribble frantically each right and left turn in longhand. To subscribe to any of the NBHC groups, send an e-mail message to Chuck Williamson at CWilliamson@PimaCC.Pima.EDU.

Laurie Larson, a transcriber for the New Jersey statewide and the Cape May hotlines, has been active in posting rare bird alerts since 1990. According to Larson, reading the alerts is a good way "to keep an eye on what's coming and going along the rest of your flyway. They create an awareness in you," she says. "You know that nighthawks are starting to show up in New York and that you should keep an eye out for them."

An early contributor to BirdChat, Larson recalls past years when users compiled arrival and departure dates for warblers, tracked Black Terns, and kept tabs on Northern Wheatears,

HEADING OUT ON THE INFORMATION SUPERHIGHWAY

If you've decided to hop on the information superhighway, how do you get there and what will you find when you arrive? It doesn't take a cybernaut (rocket scientists are so passé) to get up and running on the Internet, but you should have a rudimentary knowledge of how to operate a computer. If you own an older computer, you may want to upgrade to one that's faster and has more memory. You'll need a computer with at least 8 megabytes (MB) of random access memory (RAM) if you're planning to trip the fantastic World Wide Web, but I'd highly recommend buying one with 16 MB for the speed and convenience it provides.

If you have an adequate computer and a telephone line, the next step is to buy a modem—an electronic device that allows your computer to communicate with other computers over a telephone line. The speed of the modem you purchase is critical, since it determines how fast your computer can communicate with other computers. A 28,800 bps (bits per second) modem is your best choice; a 14,400 bps modem is much slower but acceptable; and a 9,600 bps modem is the bare minimum. (Though it's possible to use a 1,200 or 2,400 bps modem, the slowness would be unbearable.)

Once you have all your equipment in order, you'll still need to line up an Internet service provider—often available through universities, businesses, or the military—or an online service such as America Online or CompuServe. These "gateway" services provide the connection you'll need to log on, receive mail, and find your way around. Several long-distance telephone companies have recently gotten into the Internet access business, and Microsoft Network now offers its own online access. Online services usually provide the software you'll need to install, run, and manage your account. To find information on local providers, try checking with a computer store in your area or look through the computer section of your local newspaper.

You can contact the major commercial online services at one of the toll free numbers listed in the box at right. Prices vary, but each service charges a basic monthly fee that includes a certain number of hours online at no extra cost. If you exceed those allotted hours, however, additional charges can build up quickly. Some companies charge one monthly fee with unlimited access. All of these services offer access to the World Wide Web.

With the commercial services, if you are particularly judicious and can connect to a local telephone number that does not burden you with additional message units per minute, you could conceivably keep your monthly costs under $10. But expect to pay more, especially if you crawl the Web.

— *Sandra L. Sherman*

ONLINE SERVICES

America Online: (800) 827-6364

CompuServe: (800) 524-3388

Prodigy: (800) 776-3449

Microsoft Network: (800) 426-9400

CORNELL WEB SITES

Lab of Ornithology:
http://www.ornith.cornell.edu

Fuertes Bird Images:
http://oitnext.cit.cornell.edu/libraryimages/Fuertesbirds.html

an annual but uncommon Eurasian visitor to the lower 48 states. But BirdChat really proved its worth when a Whiskered Tern showed up at Cape May, New Jersey, in 1993. The first North American record of this inland European waterbird, the tern was spotted on a Monday at Cape May, disappeared on Thursday, and then was found and re-identified four days later across the bay in Delaware. And BirdChat kept everyone informed of the bird's whereabouts. "It was exciting to have up-to-the-minute details on a first U.S. record," says Larson. "People on the other side of the world were sharing our excitement; to have them comment on the identification was neat."

Rob Scott says that BirdChat has raised his excitement about birds that pass through his area—and it has provided a way to share what he's seen, write up notes, and have them critiqued. "Probably the most valuable thing I've learned, especially from BirdChat, is how to take good field notes," says Scott.

Deb Barshafsky of Augusta, Georgia, likes most the sense of community she's found as a BirdChat participant. "We share all the things that real communities share—seriousness, philosophy, humor, friendly bantering—wild birds being the tie that binds us," she writes. "For me, BirdChat is about more than just finding answers to all my birding questions; it's about sitting back and enjoying conversations between very different people from very different places with very different ideas and opinions."

The newsgroup rec.birds has some overlap with the BirdChat crowd but probably appeals more to backyard bird watchers than to serious birders. One of its best accomplishments is its FAQ (pronounced "fak"), which stands for Frequently Asked Questions. This document covers a broad range of information about birds, such as what to do with injured birds, how to keep squirrels away from your feeders, what kind of binoculars to buy, where to find birdsong recordings, and more.

Rob Scott maintains an Electronic Birding Resources FAQ. His offering lists and explains a variety of electronic mailing lists, dial-up bulletin boards, web sites, and other wild-bird-related resources. It's an excellent road map that will help you decide where to go and how to get there. To get a copy, send him an e-mail message at rs18@cornell.edu.

And now, for the fun: the World Wide Web—an interconnected, international tangle of computers that brings the world to your computer monitor. Individuals or organizations can set up personalized "web sites" or "home pages" that can be accessed by anyone with an adequate computer, a modem, and the appropriate software. By clicking on an underlined word or phrase, called a "link," you can bring a colorful maze of resources, including text, sight, and sound to your computer screen. With one click of the mouse, you can connect to one of thousands of computers running throughout the world. The only other thing you'll need to get full access to the World Wide Web is a web browser, the software that allows your mouse to roam the home pages of the world. All the major online services offer access to the Web.

The Web is known as such because, as you enter one site and delve into its links with other resources, you find yourself branching into finer and finer veins of connections. Very often, links are repeated in various sites. As home pages have become easier to set up, the numbers have really exploded. Your particular web browser will probably have a search mechanism to find hundreds of interesting sites for you. Some of these sites are permanent and are updated frequently, while others may be seasonal.

So, where in the world would you like to go? Here are some choices available at the time of writing: listen to the voice of a Laughing Kookaburra from the Australian National Botanic Gardens; call up checklists of species in many states or countries; learn the history of John James Audubon's prints; read BirdChat in digest form without having to subscribe; take a peek at Louis Agassiz Fuertes's bird images at Cornell University; review the latest population trends of North American birds; find out about the International Crane Foundation in Wisconsin; or apply for a job banding birds in Sweden. Whew!

For a quick reference to a lot of bird-related material (as well as any other subject under the sun), contact Yahoo, a subject-oriented guide to the Web at <http://www.yahoo.com/>. Between the birding web sites and the various chatlines, birders can get answers to just about any questions they have.

So, what will be the future of Internet birding? Chuck Williamson believes that online birders will become a valuable resource in the field of ornithology, because they are more likely than other people to take part in "citizen science" projects. Rob Scott concurs, and adds that since most of the data these birders provide is already keyed in, data entry expenses for these projects will be minimal. And besides the scientific value, birding the Internet is fun. But, says Scott, "Obviously, everybody's still got to get out in the field and continue to watch birds. You can't stay behind your computer."

A point well taken. So, if you'll excuse me now. As I write this final paragraph, it's a beautiful early spring day. And, according to BirdChat, the warblers' advance scouts are starting to arrive. It's time to stare at the sky instead of the screen. See you on the Internet. ■

Sandra L. Sherman is a newspaper editor in Philadelphia, Pennsylvania, and president of the Delaware Valley Ornithological Club.

California Birds
Their Status and Distribution
By Arnold Small

California Birds:
Their Status and Distribution
by Arnold Small

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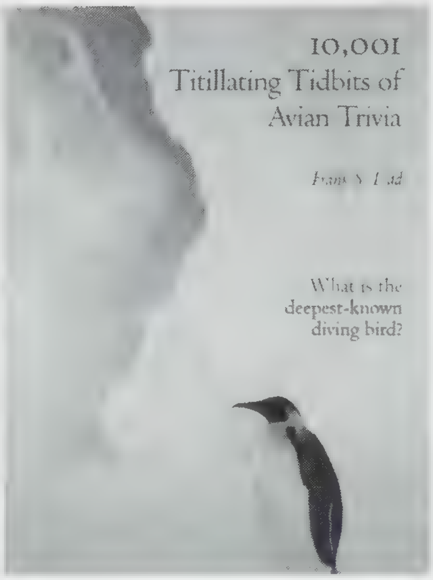

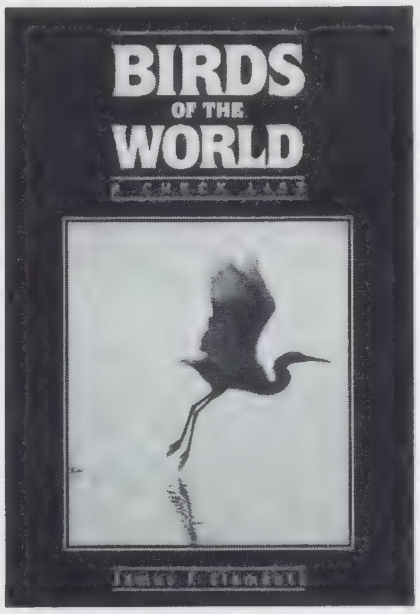

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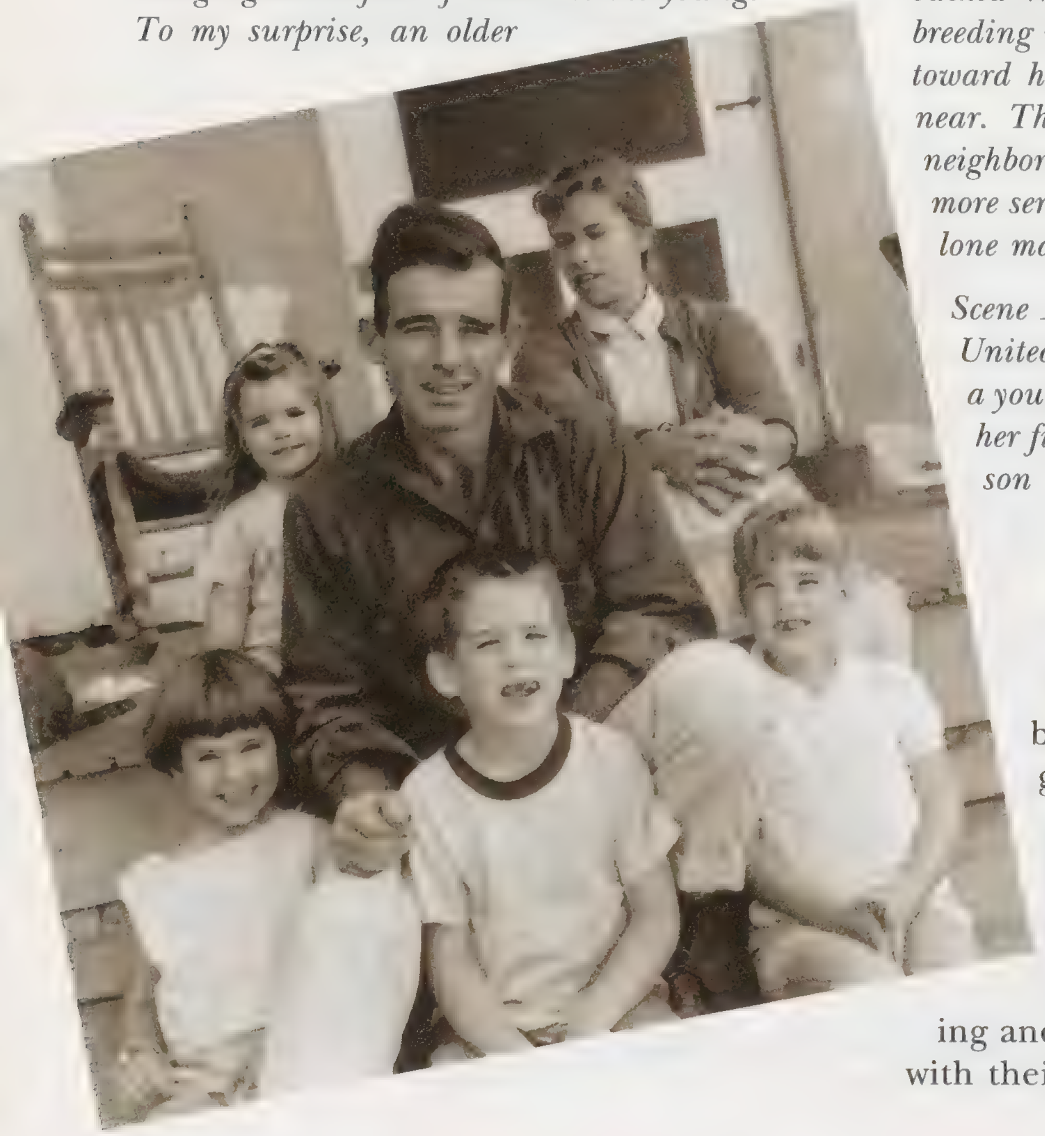
Studies of bird families can provide remarkable insights into human family dynamics

Compare these everyday scenes of family life:

Scene 1: Mid-morning, Lake Nakuru National Park, Kenya. Nesting White-fronted Bee-eaters are flying to and from their Swiss-cheese style colony dug into a river bank. Five birds feed a trio of nestlings that have scurried forward to a tunnel entrance. A father, mother, and two yearling sons alternate turns, bringing mouthfuls of insects to the young. To my surprise, an older daughter who has a breeding chamber of her own nearby also offers an occasional insect to her parents' newest offspring.

Scene 2: Early afternoon in the open woodlands of Hato Masaguaral, Rancher Tomas Blohm's wildlife reserve in the llanos *of central Venezuela. The air is filled with the noisy duets of mated pairs of Stripe-backed Wrens. Chaos reigns on the territory of one breeding male. He has been unrelentingly aggressive toward his son, chasing him whenever he gets too near. The situation is strikingly dissimilar on a neighboring territory, where relations couldn't be more serene between another breeding male and his lone male offspring.*

Scene 3: Late afternoon at a radio station in the United States. A talk show host takes a call from a young woman seeking advice on how to handle her fiancé's request. He wants to take his young son along on their upcoming honeymoon.



Scenes of cooperation, conflict, and competition: we see these attributes in bird families and in human families. In truth, the similarities between the two types of families may be greater than the differences.

Turn-of-the-century nature writers had a penchant for describing bird behavior in flowery language that evoked human qualities. They often described male birds as hard-working and faithful partners, toiling side-by-side with their mates to rear their equally diligent children. But burdening avian species with human family values is scientifically risky. For example, we know from modern DNA paternity studies that in many apparently monogamous bird species, the mates are far less faithful than we once thought.

Although we can't apply human values to bird families, we can examine what we know about the basic biological rules of social engagement in bird families to see if these rules apply to human beings. In proposing that bird studies may help us understand human interactions, I base my logic on a key observation: Many aspects of avian family dynamics are becoming highly predictable. The more we know about family structure and kin relationships in birds, the more accurately we can predict whether a certain interaction between two birds is taking place in an amicable or antagonistic context. Furthermore, we can actually predict which birds will participate in a given interaction.

I also base my logic on three assumptions. The first is that highly complex and flexible behaviors can be best understood when we consider them within an adaptive framework, that is, when we realize who benefits from any given encounter and how that benefit is derived. All organisms have aggressive, submissive, and cooperative behaviors in their repertoires. What natural selection does is fine-tune the animal's ability to express each behavior in its adaptively appropriate context. The individuals that are best at making decisions that improve their reproductive success will leave behind the most descendants to perpetuate their family lineage.

A second and perhaps more contentious assumption is that some of the decision-making

DARRELL GULIN

Some birds live in groups that are much like human families. For example, among White-fronted Bee-eaters, above, older daughters and sons often help their parents out when it's feeding time for new nestlings. What can we learn about human behavior from such avian examples? Cornell ornithologist Stephen Emlen examines the question.

BHL

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rules we humans use to choose and express our own social behaviors also have a partly heritable basis. Until recently, most anthropologists assumed that genetic influences on human behavior were at best, very minor. But that view is rapidly changing. The emerging field of evolutionary psychology is based on the premise that the information-processing "programs" that evolved in our hunter-gatherer ancestors are still important to humans today. We have inherited certain biological predispositions for how to interact with relatives, friends, and strangers. Even if some of these predispositions are no longer adaptive to our current lifestyles, we must contend with them today.

Natalie Demong, above, takes notes on White-fronted Bee-eaters in Kenya's Lake Nakuru National Park. Careful studies of tagged or banded birds reveal how family relations influence behavior.

NATALIE J. DEMONG

Third, and most importantly, birds live in social groups that, structurally, are remarkably similar to those of early humans. For example, a long-term, pair-bond is the norm; so is routine care of offspring by the male (as well as the female) parent. Birds, more than most mammals, and even more than most primates, offer family models that are most comparable to those of humans. By studying animals that live in social environments similar to the ones in which humans evolved, we may discover similar "decision rules" that shape social engagements.

In my studies of avian family systems, I have focused my attention on the small number (about 3 percent) of bird species that live in family groups in which mature offspring continue to interact with one or both parents. Typically these groups form when the offspring, instead of dispersing to territories of their own, stay with one or both parents on their natal territories—even after they are sexually mature. Most family-dwelling bird species live in the New and Old World tropics, but a few are year-round residents of North America.

What do we know about the family dynamics of such species? Perhaps most striking, more than 90 percent of them practice cooperative breeding, a system in which nonbreeding adult members of a group routinely help rear offspring that are not genetically their own. Such cooperation is rarely found in species that don't form family groups.

We should not be surprised to find high levels of amicability and cooperation in intact families—families in which the two parents stay together as a breeding pair. This behavior is partially explained by kin selection theory: an individual can enhance its own biological fitness by helping family members increase their reproductive success. The helper receives indirect genetic benefits in direct proportion to how closely it is related to the birds it helps. Thus the closer the kinship, the greater the tendency for animals to cooperate.

This is the situation among the bee-eaters in the opening scene: sons and daughters often help raise their parents' current offspring. Had we looked for a case of a nephew or niece helping an uncle and aunt, it would have been harder to find—but not impossible. Cases of unrelated birds serving as helpers are rarer still. Helping behavior is usually targeted toward the closest kin available—and it almost never exists outside of families.

A second reason for the increased harmony in intact families is reduced sexual competition. Most potential extra-pair sexual partners within a family are close kin. But because incestuous matings can have harmful genetic consequences, natural selection has fostered mechanisms that help birds avoid inbreeding. Thus, sons rarely compete with their fathers (and daughters rarely compete with their mothers) for sexual access to a parent's spouse. Likewise, siblings don't seek sexual relations with one another, despite their frequent social interactions. The result of these incest-avoidance mechanisms is increased family harmony—especially compared to the courtship disruption, mate guarding, and other sexually related aggressive behaviors we see in non-family groups.

Harmony in family interactions may evaporate if a bird parent dies or divorces. If the remaining parent takes a new mate, a stepfamily is created, and the family dynamics can instantly become contentious on a number of fronts. First, since a stepparent is genetically unrelated to its new mate's resident offspring, it is not bound by any incest restriction. A stepparent may find a willing partner among his or her stepchildren, especially if the stepchild doesn't have any chance of finding a mate and a territory outside of the family.

This is the situation depicted among the Stripe-backed Wrens in the second scene. The aggressive male is struggling to keep his mature son away from his new mate, who is about to lay her eggs. The molecular paternity data collected for this species show that whereas sons never reproduce with their mothers, they sometimes do copulate with their stepmothers and sire young. So in this wren family, we see mate-guarding and other aggressive behaviors that contrast with the harmony of the neighboring intact family, in which the female is also about to lay her eggs, but the son displays no sexual interest in his mother.

Because a stepparent is not related to its new mate's dependent offspring, it also has little biological incentive to care for them. In fact, such care may delay its own reproduction with the new mate or decrease the prospect that its new offspring will survive. Thus, the stepparent may benefit by forcibly terminating all care to its mate's offspring. The extreme example of this behavior, infanticide, is well documented in birds and social carnivores such as lions. The risk of infanticide, abandonment, or eviction is greatest if the stepparent is of the dominant sex (in birds, generally the male).

Scene 4: Noon, Cousin Island, one of the Seychelles Islands in the western Indian Ocean. The endemic Seychelles Warblers are well into their breeding season. In a tropical woodland atop a steep granite hill at the center of the island, a yearling female helps to provision her parents' nest. She has been helping them all week, bringing almost as much food as each of her parents. Nearby, another female warbler is also bringing insects to her parents' nestlings, but much less often than the first female. At a third nest, the attendant yearling female doesn't lift a feather to help out.

This scenario, taken from the research of Dutch ornithologist Jan Komdeur, exemplifies what often happens when offspring find themselves in a stepfamily. Offspring from an original pairing will be only half as closely related to new young produced by their surviving parent and new stepparent as they would have been to full siblings, so they stand to gain only half as much in indirect fitness benefits from helping. Older half-sibs sometimes don't help at all. In the Seychelles Warbler example above, the industrious helper was aiding her intact family, whereas the second helper was assisting a parent and stepparent. Not only did she make fewer provisioning visits per hour than the first female, she ultimately helped for fewer days. The third female, like the first two, was living on her natal territory, but it had been acquired by a new pair. Since she was not related to the breeding pair and their dependent offspring, she did not offer any assistance—just as kin selection theory predicted. Bee-eaters and Florida Scrub-Jays (whose social system has been studied by Ronald Mumme, Glen Woolfenden, and Cornell Lab of Ornithology director John Fitzpatrick) show the same pattern of reduced helping behavior in stepfamilies.

The closer the kinship, the greater the tendency for animals to cooperate.

Studies of Seychelles Warblers have also provided insights into family stability. As part of a bird conservation program, researchers relocated some adult breeding pairs from Cousin Island to neighboring islands. This left some territories vacant. Provided with opportunities to breed, many offspring left their parents' territories and families dissolved. Komdeur noticed a curious pattern, however, in which birds dispersed into the vacant territories. Mature offspring that had been reared in low-quality territories left home to fill the vacancies. Offspring whose families held high-quality territories stayed put.

One prediction we can make from these results is that if an avian family holds a piece of prime real estate, the territory will stay in the family for many generations, creating a sort of bird "dynasty." Should a natural disaster devastate the area and reduce the relative quality of the family holdings, however, the dynasty would probably dissolve.

Returning to stepfamilies, conflicts of interest are further intensified once the new couple have offspring of their own. This is because so many different degrees of relationship now exist within the family. For example, when a female takes a new mate and produces a new brood, she is equally related to all her offspring. But the various coefficients of relatedness between full-sibs and half-sibs (and any step-sibs, should the stepfather bring his offspring into the new family) will result in a host of cooperative and competitive alliances. Even the female and her new mate will disagree over the amount of parental investment each offspring should receive.

When all of these data are combined, the unavoidable conclusion is that a stepfamily is less stable than an intact family. Offspring have fewer reasons to stay home, and the varying degrees of kinship among family members leads to conflict, even between the parents themselves. I know of no studies analyzing the rate of "divorce" among parents in avian stepfamilies, but I predict it will be high.

Husband-and-wife team Stephen Emlen and Natalie Demong, above, demonstrate the advantages of collaboration between family members.

NATALIE J. DEMONG

The profound disruptions we find in the social dynamics of the avian stepfamily closely mirror the data available from studies of human stepfamilies. Large-scale studies consistently show that stepparents do spend less time and effort on the offspring from their partner's previous marriage than they do on their own children; that stepchildren are at greater risk for child abuse than children in intact families; and that children report more conflicts with half-siblings and step-siblings than with full siblings. Children in stepfamilies also leave home significantly earlier than children in intact families.

Should people who are stepparents, stepchildren, or stepgrandparents be discouraged by these findings? I think not. Rather, we should accept what evolutionary theory predicts: conflict and strife are statistically more likely to occur, and occur more intensely, in stepfamilies than in intact families. By recognizing the increased potential for conflict, we can become more sensitive to it. We can anticipate problems and deal with them early on, in ways that promote harmony and stability within the new family.

Biological predispositions are just that—predispositions. We humans can use our intellectual resources to modify undesirable behaviors (although we need to recognize that deep-seated behaviors may be difficult to change).

The young woman who called the radio talk show received an insightful answer. The host did not discuss kin conflicts, as I might have done, but she did accurately describe the situation. She reminded the caller that she was about to form a stepfamily. Given this situation, she should not expect that she and her husband would have the same kind of honeymoon as a couple without children. The radio host's overriding concern was that the small child feel welcome and supported in his new family.

Cooperation, conflict, and competition are elements common to both bird and human families. We are coming to realize that the rules governing these behaviors are fundamentally similar in both groups. I doubt that many birders and ornithologists appreciate the potential contributions they can make to society whenever they pick up their binoculars to observe bird behavior. By seeking and interpreting patterns in behavior, we discover that the importance of avian research extends well beyond the birds themselves. It offers instruction that is directly relevant to the drama of our own lives. ■

Stephen T. Emlen is the Jacob Gould Schurmann Professor of Behavioral Ecology at Cornell University and a former member of the administrative board of the Cornell Laboratory of Ornithology. He has studied the evolution of cooperative breeding for more than two decades and is currently conducting research on the polyandrous Wattled Jacana in the Republic of Panama. His intensive study of White-fronted Bee-eaters is described in the Winter 1992 issue of Living Bird.

Natalie J. Demong has years of field experience studying populations of color-marked birds. She is a freelance writer and photographer who, with husband Emlen, lives near Ithaca, New York.

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Profile

A BIRD IN THE HAND

by Cynthia Berger

To study the nature of species, says Ned Johnson, you need to take a closer look

Ned Johnson remembers well the moment he first got hooked on birds. He was seven years old at the time, strolling through a city park with his mother, when a "Red-shafted" Flicker flew up and lit on a tree barely four feet from his face. "It happened in an instant," he says. "I couldn't believe how beautiful it was. That flicker just crystallized things for me."

Now, 56 years later, Johnson is a systematist—a scientist who groups living creatures into logical, related categories. And he also remembers the event that led to this career choice. When he was a high school senior, his brother enrolled in an ornithology course at the University of Nevada. "Talk about a different world," Johnson says, his tone as dry as the sands of his home state. "In those days they put a shotgun into each student's hands and told everyone to collect 10 bird specimens." Now a professor of ornithology at the University of California, Berkeley, Johnson adds, "Of course, we don't do that anymore."

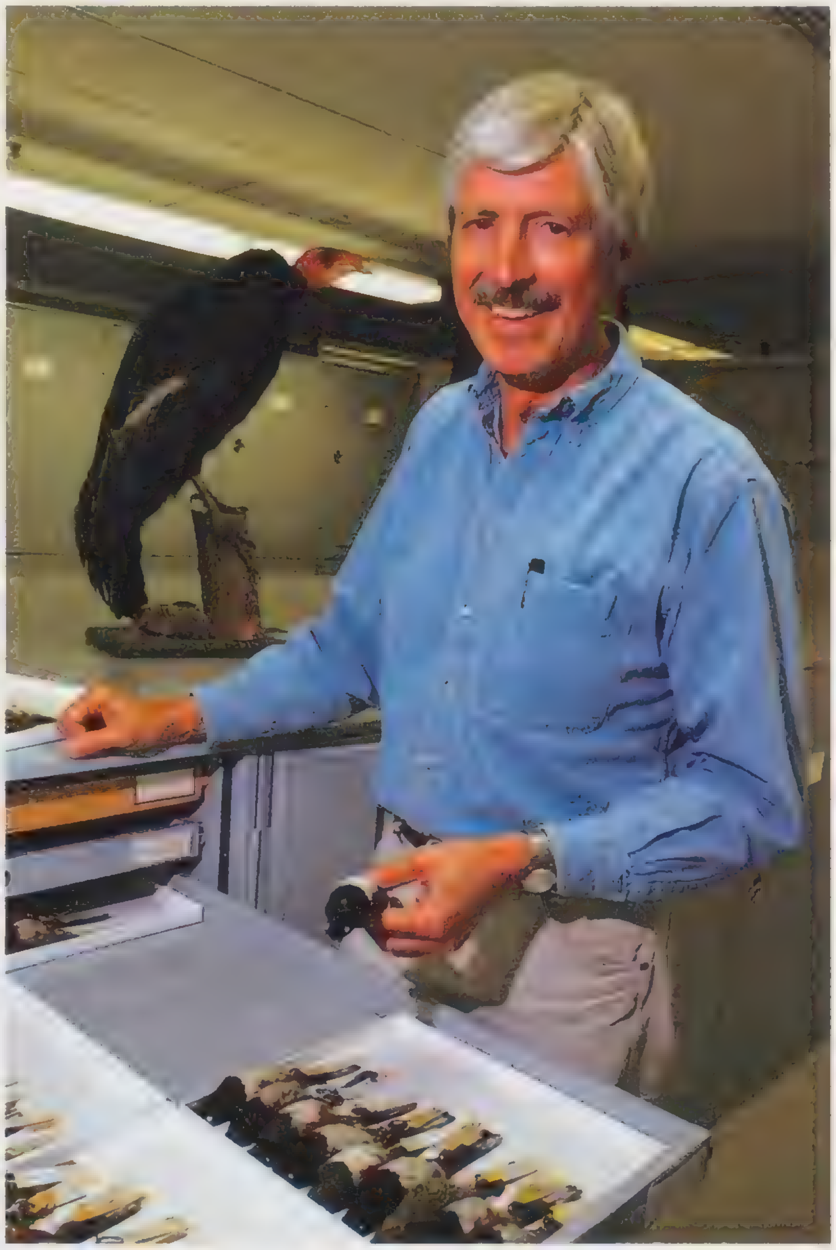
The West was still wild when Johnson was growing up. Often, he would sneak out of the house before dawn to go birding and trout fishing in the canyons near his home town of Reno—a habit his Mormon parents mostly tolerated. So it was natural for him to tag along and help his brother with his homework. But he found that collecting birds, holding them in his hand for a good, close look, brought a new dimension to birding.

He was amazed at how birds that seemed identical from a distance were distinctly different up close. "In subtle ways, everything I collected was different from everything else," he says. "Within a single species, there could be so much variation."

Johnson followed his brother to the University of Nevada, where he was quickly hired to collect specimens for the university's fledgling collection. Part of his job was to prepare "study skins," converting a bird into a cotton-stuffed cylinder, the head, legs, and wings left intact to allow exact measurements of wing length or beak shape. He has prepared a few more study skins since then. "In fact, I can tell you exactly, " he says. "Six thousand, five hundred and eight." Each of these study skins is like a reusable puzzle piece. When it is fitted together with other chunks of data—the pitch and frequency of a song, the proteins expressed by a gene—a pattern emerges that reveals the relationships among species, and their evolutionary history.

Johnson's first collecting job ultimately led to the position he now holds at Berkeley. Whenever he wasn't sure of a specimen's identity, he would mail the bird to Alden Miller, the director of the Museum of Vertebrate Zoology at Berkeley. Berkeley was then (as it is today) the center of western ornithology, and Miller was Johnson's hero. So when the time came for graduate study, Johnson naturally chose Berkeley. And he has been there ever since, stepping into Miller's shoes as curator of the museum's ornithology collection soon after completing his Ph.D.

Over the years Johnson has worked unswervingly to investigate what first puzzled him about those birds-in-the-hand—the variation among individuals within a species. He is particularly


PEG SCORPINSKI

Ned Johnson has added thousands of study skins to the bird collection at the University of California, Berkeley's Museum of Vertebrate Zoology.

famous for his work on *Empidonax* flycatchers—those raspy-voiced insect-eaters, so difficult to tell apart in the field. His painstaking comparisons of the voices and genetic makeup of birds from various locations revealed that the bird earlier taxonomists called the Western Flycatcher was really two distinct species: the Pacific-slope Flycatcher, named for its breeding grounds on the western slopes of the Cascade and Sierra Nevada mountains, and the Cordilleran Flycatcher, which raises its young on the eastern slopes.

PEG SCORPINSKI

Ned Johnson, above, uses a reflectance spectrophotometer to determine the exact feather color of a specimen.

The American Ornithologists' Union (AOU) recognized this discovery in 1992 by presenting Johnson with the William Brewster Memorial Award. The award is given to honor the most meritorious body of work on birds of the Western Hemisphere published in the previous 10 years. Johnson's flycatcher monograph was cited as "perhaps the most detailed and comprehensive analysis of geographic variation in any group of birds." Today Johnson is president of the AOU, another recognition of his accomplishments.

Fellow ornithologists admire the way Johnson embraces new technologies. "Ned got his Ph.D. at a time when people studied geographic variation by measuring simple things—wing length or leg length," says Van Remsen, curator of the Museum of Natural Science at Louisiana State University. "Data analysis meant the most basic statistics—mean and standard deviation." Like the species he studies, Johnson has evolved, learning to do modern statistical analyses, bird-sound recording and sound analyses, precise spectrophotometric studies of plumage color, isozyme studies, and DNA sequencing. "None of these techniques is easy," says Remsen. "But Ned has kept up."

Johnson's peers also admire his commitment to hands-on field work. He spends one to three months out of every year in the field, recording bird sounds and making the thousands of painstaking observations that his science requires. "I'd die if I couldn't get in the field," he says. His camper, fixed up as a mobile lab, helps him work efficiently. ("Lets me park right under the bird," he jokes.) And being in the field means he can sometimes indulge his other childhood passion, trout fishing. "I do sometimes work on birds that occur along trout streams," he admits.

The mix of field and lab work has helped Johnson tease apart bird relationships not just in the *Empidonax* complex but in sapsuckers, Sage Sparrows, towhees, and vireos, to name a few. His ongoing work on the Solitary Vireo is a classic example of how our understanding of the word "species" is changing. The bird with the bold white spectacles comes in three distinct forms: the "Blue-headed Vireo," which has an olive-green back and rump and is found in the Northeast; the "Cassin's Vireo," which is paler than the eastern bird, found along the West Coast; and the "Plumbeous Vireo," gray-and-white and larger than the others, found in the Rockies and Great Basin. The birds don't just look different; each has a distinctive voice.

"Birders have always recognized the differences," says Johnson. "But taxonomists incorrectly assumed that the birds interbreed on the edges of their ranges, and so lumped them into a single species." Johnson launched an elaborate multidimensional analysis of the Solitary Vireo complex, examining the birds' voices, body shape and size, plumage color, and genetic make-up. "Different songs, different protein chains, everything you look at," he concludes. "They're perfectly good species."

"Ned's work forms the essential foundation of bird science," says Lab of Ornithology director John Fitzpatrick. "His studies of species relationships are the most solid in the country. What's more, most people don't think this type of basic research is relevant to bird conservation—but it is."

The traditional approach to species protection, says Fitzpatrick, is to save a few big places with rare species in them. But this solution isn't sufficient, given what Johnson has revealed about the nature of species. Since a species usually consists of several populations living in different places, the "big-preserve" approach leaves some populations out in the cold. "The populations we don't protect might be on their way to being something else," says Fitzpatrick. "Ned is studying the 'tension zone' in the evolutionary process, where forms are just starting to be reproductively isolated. Real conservation—long-term conservation—means protecting evolutionary potential, not just what we have now."

It might seem contradictory that killing birds to obtain study specimens is a step toward bird conservation. Some people object even to judicious collecting, saying that science should be able to proceed without sacrificing birds. In response, Johnson points to the unique, enduring value of each specimen—and also to the lack of hard data indicating that scientific collecting is harmful. "I've never been sorry about taking specimens," he says. "The species I study aren't endangered, they're common, the level of natural mortality is high, and I don't take very many from any one location. So my collecting hasn't made an impact on any population.

"Meanwhile," he says, "the birds I've collected are available for other people to study. And every single one has taught me something." ■

Critics' Corner

YOUR QUESTIONS ANSWERED

WILD ABOUT BIRDS

by Carrol Henderson

Saint Paul, Minnesota: Minnesota's Bookstore; 1995. Soft-covered, 278 pages, $19.95.

Here at the Lab of Ornithology's education department, people frequently call with questions about feeding birds. Most are fairly easy to answer: "How can I attract more cardinals?" "How can I get rid of the House Sparrows at my feeder?" But one day last week someone called with a question that almost had me stumped. "What should I feed gulls?" the woman asked, worried about the hungry birds hanging around the parking lot of a nearby fast food restaurant. Though gull feeding is a far stretch from the kind of questions I usually answer, I told her that I'd research the topic and call her back.

I checked all my usual bird feeding information sources, but none of them listed gulls except as pests. Finally I turned to a new book I had recently received: *Wild About Birds.* Written by Carrol Henderson, the book is the third volume of a trilogy about attracting birds in the Midwest. Perhaps it would have the answer I was looking for.

As I scanned the book for gull facts, I couldn't help noticing the wealth of information—species descriptions, tips on what and how to feed various birds. I also noticed the convenient spiral binding, which would make it easy for me to keep my place in the book as I spoke on the telephone. The color photographs—most of them taken by the author—were excellent, inviting me into the book.

The first section is dedicated to the birds themselves. Henderson writes clear, page-long descriptions of nearly 70 species, including permanent resident birds, short- and long-distance migrants, and Canadian boreal migrants. His succinct descriptions contain fascinating tidbits about the birds' life histories, as well as their favored habitats, foods, and feeding habits. Henderson describes creative ways to attract birds to your feeders. Hairy Woodpeckers, for example, he says "are easy to attract with suet feeders, deer rib cages, or peanut feeders. They will also take hummingbird nectar solutions (four parts water to one part sugar)."

Wild About Birds
Minnesota Department of Natural Resources
Carrol L. Henderson

Accompanying the above text, Henderson includes close-up, side-by-side photographs of a Hairy Woodpecker and a Downy Woodpecker to show how to distinguish between these look-alike species. He does the same thing with Purple Finches and House Finches. I regret that he does not supply comparative photographs of a Cooper's Hawk and a Sharp-shinned Hawk in the chapter on birds of prey at feeders, but he does cover the identification and feeding habits of these and several other raptors.

Henderson devotes an entire 20-page chapter to describing the types of food available for bird feeding. He looks at 10 kinds of seeds, indicating the bird species that prefer each kind, and he offers tips on when and how to offer the seed. He is frank in his assessments: "If you try to save money by feeding millet mixes instead of sunflower seeds, you will get fewer species of birds and more House Sparrows." Then he addresses fruit and kitchen foods. We all know about feeding orange halves and dried currants to birds, but have you ever tried putting out eggshells or dry dog food?

No bird feeding book would be complete without information on problem animals and birds at feeders. *Wild About Birds* contains solutions to problems caused by critters as ubiquitous as raccoons, skunks, and cats and as rare (to most of us, at least) as bears. Most helpful are the explanations of why the mammals come to feeders—knowledge that can assist homeowners in trouble-shooting their own unique situations.

Finally, Henderson provides 26 different bird feeder designs for do-it yourselfers, with useful tips that will help the greenest woodworker turn out a masterpiece. He also offers simple and effective methods for providing dry provisions to ground-feeding birds, such as sparrows, doves, and juncos.

But back to the task at hand: what should I tell the woman who asked about feeding gulls? Flipping through the section on short-distance migrants, I found Ring-billed Gull, complete with a description of the food it eats and its feeding habits. Based on what I read I concluded that she should offer gulls table scraps consisting of fish, beef, or other meat, but in limited quantities so that other animals won't be attracted to the area.

If you live in the Midwest or Northeast and you're concerned about what to feed your local gulls—or cardinals, or finches, or sparrows, or doves—*Wild About Birds* will probably have all the advice you need. I was certainly glad to add the book to my library of question-answering resources.

—*Martha Fischer*

The Catbird Seat

SEPARATING HOAGIES

by Pete Dunne

We were sitting at the hawk watch eating hoagies—South Jersey subs. P.B.'s was a turkey and Swiss; mine was Italian with everything on it—not that you'd know this by simply looking at them. Hoagies are sort of the *Empidonax* flycatchers of the sandwich world.

"The Records Committee didn't accept your Brown Noddy record," P.B. confided, putting friendship ahead of procedure.

"Tooorifik," I said, mumbling through a mouthful of salami/provolone/lettuce/tomato/pickles/hot peppers/and extra oregano.

"You aren't upset?" he wanted to know.

"Nope," I assured him, smiling grandly as I took another bite from my hoagie.

"Really?" he asked.

"Really," I said, savoring the last epicurean morsel.

P.B. paused, accepting the disclosure on face value. "Well, I wish other people were as understanding as you," he lamented.

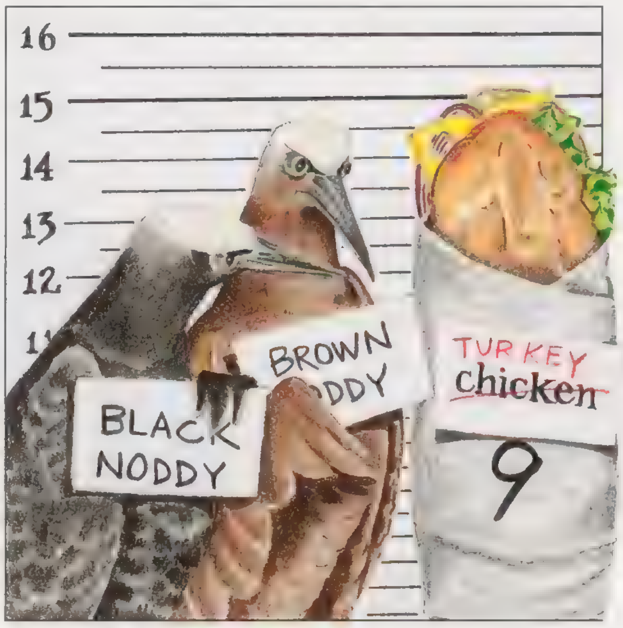
I do too, for the sake of birders and records committee members alike.

Records committees have a difficult job. Their task: review sight records of unusual species and determine, on the basis of evidence, whether the record should be added to a state's bird list.

The problem is that some birders regard records committees as the ultimate judge and jury. They believe that the acceptance or rejection of a sighting by a records committee is a reflection upon the accuracy of the identification or the skills of the observer.

It is not. It cannot be. All a records committee can do is weigh evidence and determine whether the evidence is sufficient to support acceptance. If a committee assumes more authority than this, it is overstepping its jurisdiction. If birders assume more than this, they are demeaning their own skills and responsibilities.

Look, it's simple. From the actual bird to the record book a sighting has four levels of reality. First and most fundamental is WHAT THE BIRD ACTUALLY WAS. If you believe in genetic coding; if you subscribe to the structured regimentation of Linnaeus, then you must believe that at some level all living things are directly related to nothing but another of their own kind.



Next, but not necessarily connected, is WHAT THE BIRD LOOKED LIKE—which may or may not be the same as what it was. Molting plumage can transmute Horned Grebes into Eared Grebes; distance, heat waves, and an elevated perch can transform an Iceland Gull into a Great Egret.

Now comes the human variable and level three: WHAT THE BIRD WAS IDENTIFIED AS. It might have been an Iceland Gull and it might have looked like a Great Egret. But if an observer is confident that the bill was spatula shaped . . .

Then comes the written description, based on notes and memory. Then comes the review by committee members who bring their cumulative experience to bear. Then comes WHAT THE COMMITTEE BELIEVES.

An observer is two steps removed from reality; the committee, three. Your reality, as an observer, is more fundamental than theirs. You win on points. And while they, acting responsibly, may elect not to include the record on a state bird list, that does not and should not preclude you from including it on yours.

I tried to explain this to P.B., who listened intently but wasn't entirely won over by my philosophical equanimity.

"Okay," I said. "Let's put it this way. What kind of hoagie did you have?"

"Turkey and Swiss," he said.

"On the basis of what evidence?" I demanded.

"That's what it tasted like," he asserted.

"I didn't taste it. What other evidence do you have?"

"It's what I ordered," he explained.

"You might have picked up the wrong sandwich at the counter," I suggested. "I need more evidence."

"The wrapper has a number 9 written on it," he pointed out. "Number 9 is a turkey and Swiss."

"Wrapper isn't sandwich. The counter person might have made a mistake."

"Well, I could give you a piece," he mused, "but it's all gone."

"So you can't. It's gone. And I reject your identification of turkey and Swiss on the basis of insufficient evidence."

P.B. looked puzzled, then exasperated. He started to say something but I cut him off.

"How did it taste?"

"It tasted great!"

"Then it doesn't make any difference whether I believe you or not, does it?"

"Not a bit," he said, smiling, pausing, reflecting, bringing the conversation back to where it started.

"You know," he said, in all seriousness. "Your bird could have been a Black Noddy instead of a Brown. It's possible."

"Your hoagie could have been sliced chicken and not turkey,"

"I would have known the difference," he promised.

And he would have, too. ■

ILLUSTRATION BY JEFF SIPPLE

Marsh Wren
by Terry O'Nele

ABA Sales' Bird Song Reference Chart

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For the Study and Conservation of Birds

AUTUMN 1996

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INTERNATIONAL

TIM GALLAGHER

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Will the next generation of birders enjoy the same diversity of bird species that we have today? Our primary mission at the Cornell Lab of Ornithology is to ensure that they will. By closely monitoring bird populations, examining the causes of declining bird numbers, and promoting the appreciation and conservation of birds to the public at large, we are doing our best to preserve the richness of the earth's natural biodiversity. And you can help in several ways: by joining one of our "Citizen Science" bird research projects; by encouraging a friend to become a Lab member; or just by continuing to support our work. By working together, we really can make a difference for all future generations—of birds and birders alike.

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For the Study, Appreciation, and Conservation of Birds
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A Publication of the
Cornell Laboratory of Ornithology

LIVING BIRD

AUTUMN 1996 VOLUME 15 NUMBER 4

Special Issue: A Celebration of the Lab of Ornithology

GREETINGS FROM SAPSUCKER WOODS

This edition of *Living Bird* is a landmark for us—the end of our 35th year of producing this publication. To celebrate, we're devoting the entire issue to the Cornell Lab of Ornithology. Members frequently call or write wanting to know more about our programs; few know the full scope of our work. We hope you'll enjoy learning more about the Lab's history and evolution as a bird research and conservation organization.

Living Bird has changed over the years. For its first 19 years it was a handbook-sized annual journal called *The Living Bird*, which sometimes measured an inch or more in thickness. This publication was succeeded in 1982 by *The Living Bird Quarterly*, a glossy color magazine in a larger format. The new design allowed the magazine to present large spreads of stunning bird images, appealing to a broad range of people who enjoy birds. In the ensuing years we have increased the number of pages, shortened the name to *Living Bird*, and continued to make refinements in our design.

Many people have contributed to the success of *Living Bird* over the years. We are especially grateful to Roger Tory Peterson. As a member of the Lab's administrative board in the early 1960s, he lobbied to get this organization to publish a popular journal on birds. His idea was to create a publication that would appeal to professional ornithologists and amateur bird watchers alike. He even suggested the name, *The Living Bird*, and painted the first issue's cover illustration of a Yellow-bellied Sapsucker.

As many of you probably know, Roger Tory Peterson passed away this summer. An inspiration to more than three generations of bird watchers and naturalists, Roger will be greatly missed. In honor of his many contributions to this publication, the Lab, and the world of birds, we dedicate this special issue of *Living Bird* to his memory.

—Tim Gallagher
Editor-in-Chief

Cover: This intimate portrait of a Yellow-bellied Sapsucker, the Lab's official mascot, couldn't be more appropriate for the cover of this special issue. Nature photographer Gregory K. Scott's colorful image nicely echoes the first *Living Bird* cover, at right, which appeared more than three decades earlier.

Right: The first cover of this publication—depicting a Yellow-bellied Sapsucker—was painted by the master bird artist himself, Roger Tory Peterson.

Back Cover: Autumn is a great time to look for Barred Owls in Sapsucker Woods. As the leaves drop from the trees, exposing the owls' favorite daytime roosts, these fascinating nocturnal predators are easy for sanctuary visitors to spot. Photograph by Steven D. Faccio.

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Onward and upward into a bright new millennium.

THE LIVING BIRD

FIRST ANNUAL 1962
Cornell Laboratory of Ornithology

LIVING BIRD

AUTUMN 1996 VOLUME 15 NUMBER 4

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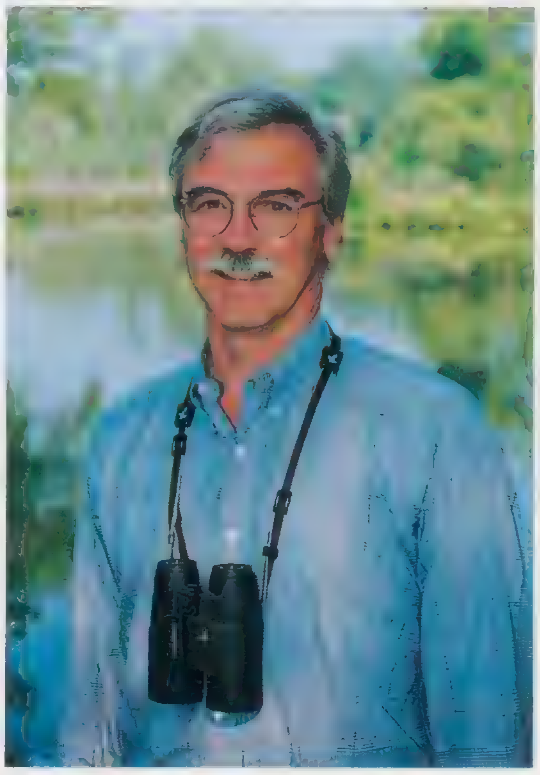
From the Director

Welcome to this special edition of *Living Bird*: a celebration of the Cornell Laboratory of Ornithology. We are proud to present a colorful description of today's Lab, focusing on its programs and some of its people, past and present.

In recent years the "Lab of O" has become truly a global clubhouse—an institute with international membership devoted to the study, appreciation, and conservation of birds and their habitats. As our mission statement emphasizes, we strive to enhance the protection of nature by increasing the enjoyment and understanding of birds among people throughout the world. Birds—through their varied colors, voices, lifestyles, and global movements—bond humans with nature in extraordinary ways. Each of the earth's 9,000 bird species responds differently to subtle environmental variations, so birds also represent sensitive barometers to environmental change: Birds tell us a great deal about what is right, and what is wrong, with the world that we are still learning to share with them.



As you will see throughout this issue, the Lab accomplishes its mission through scientific research, formal and informal education, and cooperative ventures with other organizations, both public and private. Every Lab scientist is internationally respected as a leader in a biological discipline. Our publications, including *Living Bird* and *Birdscope*, are devoted to making technical information about birds accessible to everyone who can read English—and to portraying the singular beauty of birds. Our world-famous Library of Natural Sounds is increasingly directed toward helping teach the people of the world what those sounds are that they are hearing outside their windows. And our interdisciplinary Bioacoustics Research Program is working to determine what those sounds mean.

We believe that education is a two-way affair. A large and growing proportion of our research program is citizen-based, harnessing the considerable energy and knowledge of the public for both monitoring and question-oriented studies of bird populations. We learn an enormous amount from the very same members and citizen-science participants whom we teach. In classrooms around the country, schoolchildren contribute to our national databases even while they learn how to identify birds. Students of all ages enroll in our Home Study Course in Bird Biology and share their observations with us while they learn.

The Lab is part of Cornell University—one of the world's great research and educational institutions, exceptionally strong in fields relating to birds and ecology. The Lab builds on this strength to help teach some of the nation's brightest undergraduate and graduate students about birds and natural science. Students further the Lab's mission even while they learn. As they become tomorrow's leaders, they will become powerful voices for bird conservation.

I hope you enjoy the words and images that follow. We are proud of our global clubhouse and all we are accomplishing for bird conservation.

— *John W. Fitzpatrick*
Louis Agassiz Fuertes Director

FLORIDA SCRUB-JAY BY JOE McDONALD

BIRD CONSERVATION

Our Common Mission

BY JOHN FITZPATRICK

The Lab of Ornithology exists because humans have a remarkable and intimate relationship with birds. The more we know about birds, the more we care about having healthy bird populations around us. Birds connect us with the earth. By conserving birds, we help conserve the entire planet.

The Lab's role in bird conservation has grown dramatically in recent years. Every one of our programs now contributes in some way to the long-term conservation of birds and their habitats. We take a nonadversarial approach, placing the emphasis of our work on gathering data on bird populations and educating the public about the threats that birds face. Lab scientists conduct field research in bird ecology, monitor bird populations closely, and develop tools to enhance the scope of bird monitoring schemes. We also design and conduct several "Citizen Science" projects, carried out by thousands of volunteers across North America. We form science-based partnerships with government agencies and conservation organizations. We produce educational materials and training tools to boost the skills and effectiveness of bird watchers, project volunteers, and professional ornithologists.

We develop both formal and informal programs in environmental education.

Effective conservation requires setting priorities, based on accurate information on bird populations. The Lab of Ornithology supports a host of citizen-based scientific projects of importance to bird conservation. Project FeederWatch, for example, uses data gathered by more than 10,000 participants each winter to measure the annual population trends of bird species that visit backyard feeders. The Cornell Nest Record Program has logged nesting information on more than 500 species continentwide since 1965. Project Tanager has determined the breeding habitat size requirements of four species of North American tanagers. This project demonstrated clearly that the sensitivity of these beautiful migratory birds to habitat disturbance varies geographically. Now land managers know that in the mid-Atlantic states they must preserve much larger forest patches than in the western New England states to help support the successful breeding of Scarlet Tanagers. A new Lab project called Birds in Forested Landscapes should produce similar guidelines for several other species of woodland songbirds.

JOE McDONALD

Neotropical migrants such as the Great Crested Flycatcher pictured above may be threatened both on their wintering grounds in Latin America and their breeding grounds in the United States and Canada. The Lab of Ornithology is dedicated to fostering the long-term conservation of birds and their habitats worldwide.

The Lab will continue to be a leading institute for the citizen-based monitoring of bird populations. We are joining forces with Partners In Flight (an international consortium of public agencies, private land managers, conservation groups, and forest products specialists dedicated to fostering the long-term conservation of birds and their habitats throughout the Americas) as well as the National Audubon Society, Bird Studies Canada, the National Biological Service, and a host of regional bird observatories to develop a major, continentwide bird-monitoring initiative.

The Lab of Ornithology has played a key role in Partners in Flight (PIF) since its inception. Lab biologist Kenneth V. Rosenberg is the group's Northeast Regional Coordinator, and I chair the Northeast Regional Working Group. Lab Education Program director Rick Bonney chaired the National Information and Education Working Group from 1992 to 1995 and co-chaired the Second International PIF Conference in Cape May, New Jersey, in October 1995. The Lab will soon be publishing the proceedings of that pivotal meeting. Last year the Lab published PIF's *Citizen's Guide to Migratory Bird Conservation,* which is now being revised for its second printing.

The Lab's Library of Natural Sounds recently launched a cooperative project with Conservation International to produce CDs for training students and professionals in developing countries how to inventory their indigenous birdlife, using sound. The ambitious first attempt, covering 300 bird species found in the Amazonian lowlands of southern Peru, produced such positive results that a major initiative to expand the Lab's worldwide repertoire of training CDs is now under way. Our Bioacoustics Research Program, which has developed advanced computer technology to monitor whale populations, is now adapting that technology to monitor birds.

I've spent much of my own career studying the ecology and conservation of birds. After years of field work in Central and South America, I co-authored the recently published book, *Neotropical Birds: Ecology and Conservation*—a compilation of data and conservation priorities for the New World tropics. Also, together with Glen Woolfenden and other colleagues, I have studied the ecology and conservation needs of the endangered Florida Scrub-Jay for 25 years. I coordinated the mapping of the scrub-jays and their habitat throughout Florida and drafted guidelines for the protection, recovery, and management of the species. I now participate in the recovery efforts of several other endangered species, including the Hawaiian Crow, or 'Alala—perhaps the rarest species of bird in the world. As a member of the national governing boards of both The Nature Conservancy and the National Audubon Society, I have committed my life to the conservation of birds and their habitats.

Conservation is not a science in itself. It is a complex human endeavor that combines elements of science with elements of economics, philosophy, politics, sociology, and fundraising. But genuine biological conservation must be *based* on good science. The Lab of Ornithology is dedicated to helping supply this scientific underpinning, and to do so in ways that engage the public extensively in the process. By doing its best to foster an understanding and appreciation of birds among all people, the Lab will continue to help make the world a better place for people as well as birds. ■

CITIZEN SCIENCE

A Lab Tradition

BY RICK BONNEY

The history of ornithology is replete with the contributions of amateurs. From the early 1800s, when a Scottish poet named Alexander Wilson published the first comprehensive account of North American birdlife, to the turn of the century, as the Audubon Christmas Bird Counts were born, to the present time, as thousands of birders participate in bird censuses, surveys, and research projects across the continent, amateurs have gathered a treasure house of information on bird numbers, bird movements, even basic bird biology.

The Cornell Lab of Ornithology has played a major role in this tradition. In 1929 our founder, Arthur A. Allen, began soliciting bird watchers' sightings to construct a comprehensive database of the birds of central New York's Cayuga Lake Basin. Our Nest Record Program, begun in 1965, was one of the first North American projects to seek amateur-collected data in an organized fashion. Project FeederWatch, which started in 1987, is one of the largest amateur-based data collection programs under way today. And FeederWatch is now joined by several other Lab citizen-science projects, including Project Tanager, Project PigeonWatch, and the Cornell Nest Box Network.

It's safe to say that the Lab of Ornithology depends on amateurs to collect data. But citizen science is a two-way street: Participants gain from the projects, too. From backyard birders to school children, amateur ornithologists become proficient in bird identification, acquire the skills of patient observation, imbibe the process of scientific investigation, and gain the satisfaction of furthering scientific knowledge.

The Lab also hopes that public participation in bird studies will spawn action on behalf of birds. As project participants evolve from birders to citizen scientists, we hope they'll go to work on behalf of birds. Our goal? That bird watchers will save the world.

The next few pages present an overview of the Lab's many citizen-science projects. ■

For more information on any of our citizen-science projects, contact: Education Program, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850, or telephone: (607)254-2440; e-mail: birdeducation@cornell.edu; or visit our web site (http://www.ornith.cornell.edu).

By contributing data on bird numbers and behavior on a continentwide scale, the Lab's "Citizen Scientists" make a real contribution to bird conservation. Here two Cornell Nest Box Network participants check the contents of a Tree Swallow nest.

TIM GALLAGHER

PROJECT FEEDERWATCH

A Decade of Backyard Bird Study

During winter, the most widespread backyard bird species is the Dark-eyed Junco. House Finches are spreading in the East, where they were introduced in 1940, while House Sparrows are declining steadily. The Varied Thrush undergoes a striking biennial population cycle—numbers are up one year, down the next.

How do we know? During the past nine winters, thousands of bird watchers across the continent have deluged the Lab of Ornithology with data forms containing the records of backyard bird sightings from November through March. As participants in Project FeederWatch, these people have turned their hobby into a significant contribution to ornithology. So far they have contributed nearly half a million FeederWatch data forms, from which Lab biologists are extracting a comprehensive portrait of winter bird distributions across North America.

C.C. LOCKWOOD

FeederWatch was begun in 1987 as a collaborative effort between the Lab of Ornithology and the Long Point Bird Observatory in Port Rowan, Ontario. By 1996 more than 10,000 people were signed up, representing every U.S. state (including Hawaii) and every Canadian province (even the Yukon Territory). "The data come from everywhere," says Margaret Barker, Project FeederWatch coordinator. "Suburban homes, rural farms, city windows—you name it. And from all kinds of people, too: homemakers, school kids, retired people, and even business executives watching their feeders while they drink their morning coffee. It's remarkable."

The design of FeederWatch is simple. Participants receive a "research kit" including instructions and data forms. During winter they count the birds at their feeders; in spring they send their data to the Lab, where biologists summarize the season's findings and publish an annual report in the Lab's newsletter, *Birdscope.* Later, the data are combined with numbers from previous years to determine overall species distributions, population trends, and bird movements—information that can be published in scientific journals. The latest contribution is "Population Cycles in the Varied Thrush," by Jeff Wells, et al., to be published soon in the *Canadian Journal of Zoology.*

"The beauty of FeederWatch is that we're developing a long-term database," says Lab biologist Ken Rosenberg. "For many species, winter populations are so variable that years of data are needed to determine trends. We can also study long-term relationships: Do bird population changes correlate with climatic fluctuations? Are cycles of winter irruptions correlated among species? With Project FeederWatch data, we'll be able to tell." Rosenberg adds that information on bird numbers at thousands of individual feeders provides insights into the social dynamics of bird populations and how these change over time and across different geographic areas.

Bird Population Studies director André Dhondt points out another benefit of FeederWatch. "The project has put into place a network of observers who can be mobilized quickly for additional bird study. Three years ago, for example, a disease caused by *Mycoplasma gallisepticum*—a bacterium that used to infect only poultry—was found to cause eye infections in House Finches. We asked FeederWatchers to help us track the spread of this disease through a House Finch Disease Survey, and they have responded with 18,000 data forms."

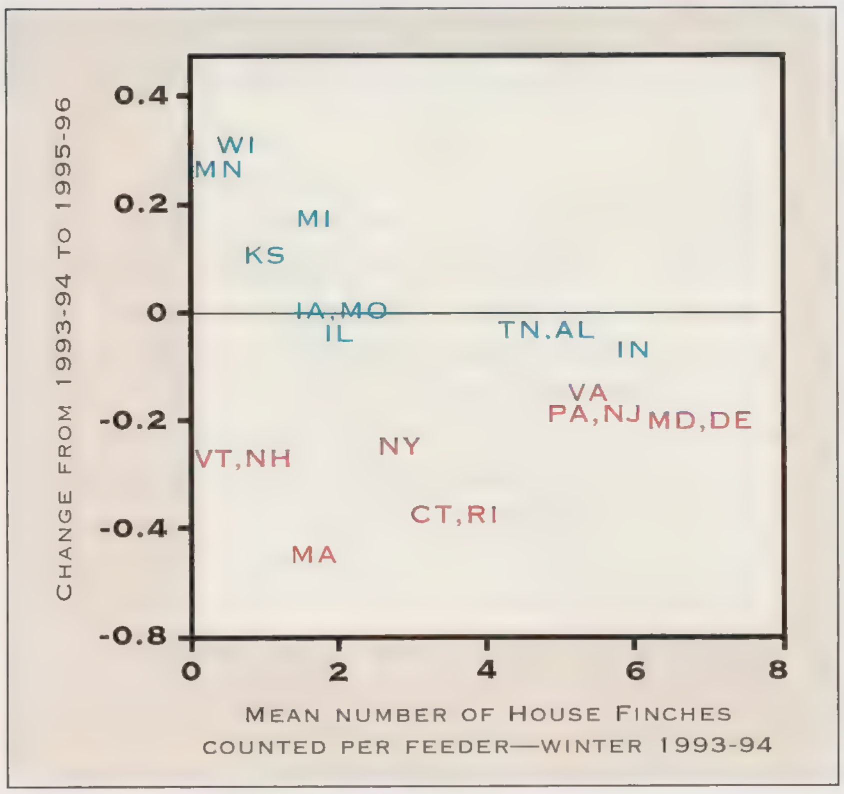
Dhondt explains that the disease spread rapidly from Maryland, where it was first observed in 1993. "When the first reports of the survey arrived in November 1994, we found that the disease was already well established from Vermont and New Hampshire in the north, to Maryland and Virginia in the south. Now, it has been reported in every state east of the Mississippi."

Combining the detailed knowledge of the disease expansion with the long-term FeederWatch data set has made it possible to determine whether the disease is affecting House Finch populations. The graph plots the change in House Finch numbers from the winter of 1993-94 to the winter of 1995-96 against the mean number of birds counted by FeederWatchers in each state during the 1993-94 winter. Two groups of states are shown: in red are those where the disease was already prevalent in November 1994; in blue are the states that the disease reached during the winter of 1995-96.

The graph makes two things clear. First, in the blue states—where the disease appeared recently—House Finch populations are either increasing or stable. In contrast, in the red states—where the disease had been well established for at least 18 months—the species populations have declined over this two-year period. This suggests that considerable numbers of House Finches are dying as a result of the epidemic.

Second, states that have the highest rate of increase in their House Finch populations, such as Wisconsin and Minnesota, are those with the lowest numbers of House Finches—states where the introduced species is still spreading, and where the disease arrived only recently (the blue states at the top and left of the graph). In states that have low House Finch numbers and where the disease hit early (such as Vermont and New Hampshire), however, the birds are already decreasing in numbers. We will be watching carefully to see if House Finch populations in other blue states start to decrease as well.

Nearly as important as the data collected, FeederWatch is fun and meaningful for its participants, all of whom pay an annual fee to keep the program in operation. Parents find that the project is a great family activity: "This has been wonderful for me and my kids," wrote one FeederWatcher from Colorado. And a woman from Maryland wrote, "Thanks for legitimizing my hours of staring out the window at birds." ■



In addition to monitoring their backyard feeder birds, many FeederWatchers are taking part in the House Finch Disease Survey, tracking the spread of a bacterial infection now sweeping through eastern House Finch populations. The graph at left illustrates the extent to which this disease has affected the numbers of these finches counted per feeder in 21 states during the time since the disease began to spread (see text). States near the horizontal line at 0 experienced little or no change in House Finch numbers at feeders, whereas states below the line showed a decrease and states above the line showed an increase in birds counted.

FEEDERWATCH IN THE CLASSROOM

Thanks to an $850,000 grant from the National Science Foundation, Project FeederWatch is going to school. Under the direction of Lab education director Rick Bonney and in conjunction with TERC, a Cambridge, Massachusetts-based educational research group, the Lab is developing a middle-school curriculum called "Classroom FeederWatch." Participating students learn about bird identification, bird biology, and even math, writing, and geography, as they count birds at their schoolyard feeders and submit data to the Lab via the Internet. Students can also electronically retrieve their data, along with information from other classes in far-flung locations, to conduct their own analyses and write their own reports. The project, which is aligned with the National Science Standards recently published by the National Research Council, was pilot tested in Boston, Massachusetts, and Ithaca, New York, this past winter. It will be field tested in about 50 schools nationwide during the 1996-97 season. Watch the Lab's newsletter, *Birdscope,* for news about this program and for excerpts from a new student-produced publication, *Classroom Birdscope.*

Citizen Science

PROJECT TANAGER

A Model Program for Large-scale Bird Research

If you follow the conservation news, you know that some bird populations are declining. We tend to hear most about endangered species, but ornithologists are also concerned about potential declines in dozens of familiar songbirds, such as warblers, vireos, and thrushes. These species, known as "Neotropical migratory birds," nest throughout North America but spend their winters in Latin America.

Consider the Wood Thrush. Although you can still hear the flutelike, yodeling song of this familiar bird in most eastern forests, its numbers have been dropping each year, according to data from the Breeding Bird Survey. Or consider the Hermit Warbler, a denizen of western coniferous forests, whose restricted breeding habitat is shrinking each year.

Declining populations of migratory birds could result from many causes, including destruction of tropical wintering grounds. In recent years, however, many ornithologists have blamed declines on "forest fragmentation," which results when large, continuous forests are chopped into smaller blocks by roads, logging, agriculture, or suburban development. Many researchers suspect that fragmentation of woodland habitat makes the birds that reside there more vulnerable to predators and nest parasites. They point out that open-country predators such as jays, crows, and cats, as well as the parasitic Brown-headed Cowbird, can easily penetrate forests that have been dissected by roads or power-line cuts.

To what exact degree is forest fragmentation causing problems for woodland birds? We don't know yet, but it's an important question. If fragmentation is a serious problem, then biologists must develop plans to minimize its effects. But how can they study such a large issue? How can they gather enough information to determine the effects of habitat structure on the breeding success of birds across an entire continent? No single scientist, or even a field team, could ever hope to collect all the necessary data.

That's where Project Tanager came in. This project was one of three "National Science Experiments" developed in 1992 by Lab Education Program director Rick Bonney and funded by a four-year grant from the National Science Foundation. (Project Tanager also received significant funding from the National Fish and Wildlife Foundation.) The other two projects were a national Seed Preference Test, which was completed in 1995, and Project PigeonWatch, an ongoing program described on page 14 of this issue.

The concept for all these projects was simple and was based on the FeederWatch model: Lab biologists would harness the energy of a large number of bird watchers willing to collect data that would answer questions of ornithological and conservation significance.

The original goal of Project Tanager was to determine the size of forests required for successful breeding of all four species of North American tanagers—the Scarlet Tanager in the Northeast, the Summer Tanager in the South, the Western Tanager west of the Rockies, and the Hepatic Tanager in Arizona and New Mexico.

LANG ELLIOTT

One of the brightest jewels in the forests of eastern North America is the Scarlet Tanager, pictured above in full song. Project Tanager volunteers have helped amass important data that will have a direct bearing on the conservation of this colorful Neotropical migrant.

Why choose tanagers for this model study? First, all four species are Neotropical migrants that could be sensitive to forest fragmentation; earlier studies had shown that the Scarlet Tanager was affected by habitat size in some parts of its range. Second, most areas within the 48 contiguous states are inside the breeding range of at least one of the four species. Finally, since tanagers are relatively conspicuous and fairly easy to identify by sight and sound, they made an ideal subject for a pilot study involving large numbers of volunteer observers.

As in other Lab citizen-science projects, participants received a research kit and followed a specific protocol, which involved selecting study sites in forests of different sizes, visiting the sites at least twice during the breeding season—first to search for tanagers and later to look for evidence of successful breeding—and sending data on their observations to the Lab.

"After two field seasons, the scope of the data turned in is remarkable," says Bird Population Studies director André Dhondt. "By collecting information from all parts of the continent in the same breeding seasons, we have shown that forest fragmentation does have a negative effect on Scarlet, Summer, and Western Tanagers. All three of these species are less

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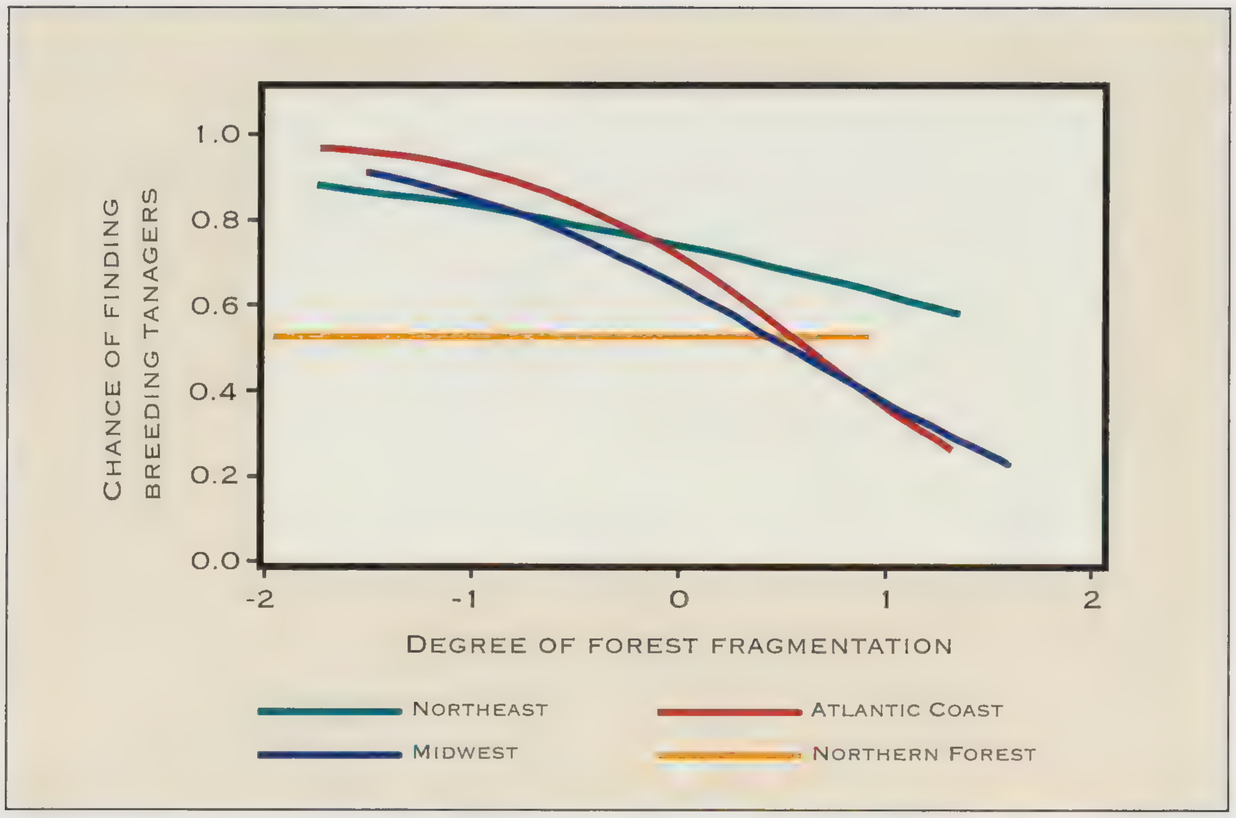
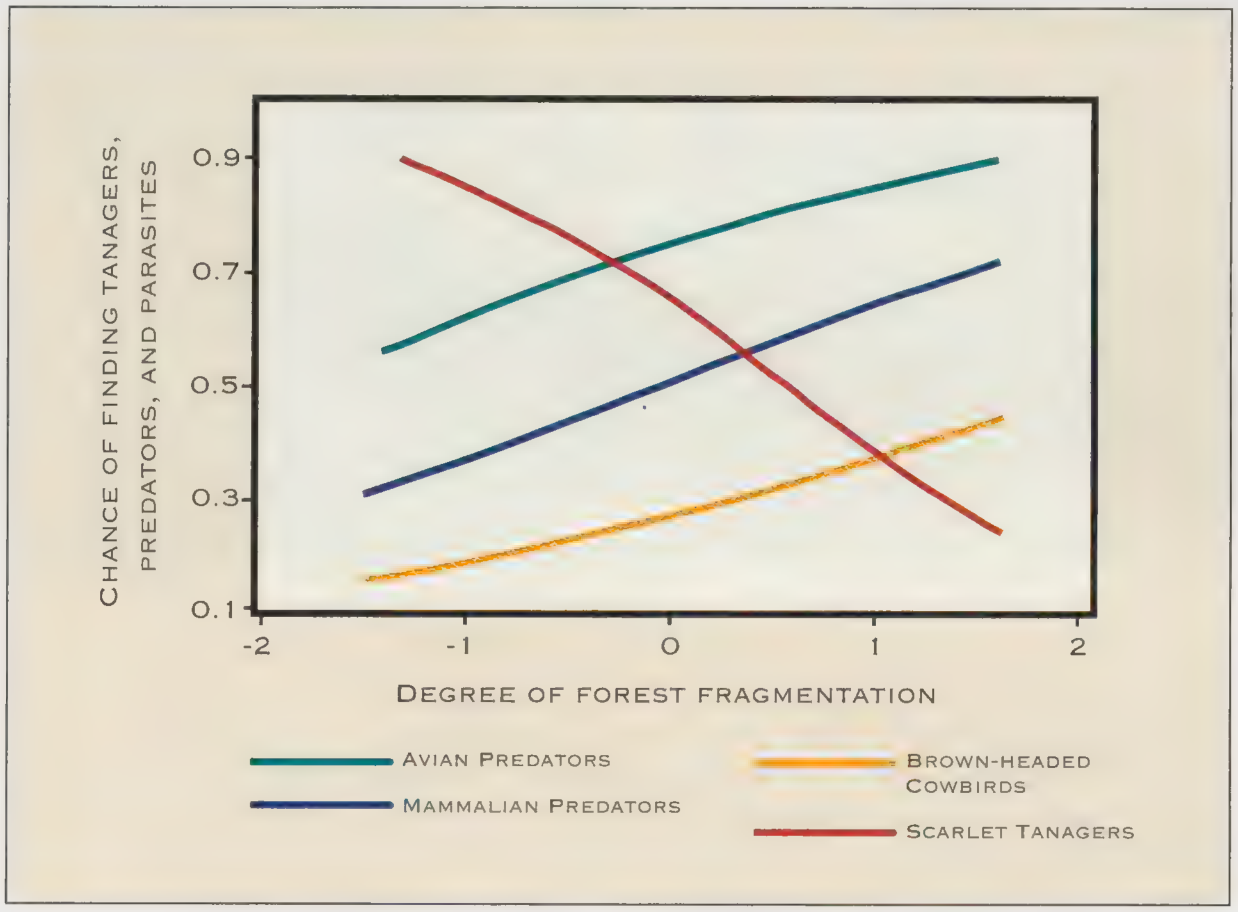


These two graphs illustrate how the chance of finding Scarlet Tanagers or nest predators and parasites (vertical axis) varies in relation to the degree of forest fragmentation (horizontal axis). The scale of fragmentation ranges from large continuous forests at the far left to small, isolated forest patches at the far right. The top graph, which compares four regions, shows that tanagers are considerably more sensitive to forest fragmentation in some regions than others (see text). The graph below—which focuses only on the Midwest region—clearly shows that Scarlet Tanagers are more likely to occur in large forest patches than in small ones in which the predators and parasites that threaten their nesting success abound.



likely to attempt breeding in smaller forests. However, the different species are affected to different degrees, and the effect also varies geographically within the range of each species."

For example, within the range of the Scarlet Tanager, fragmentation had a significantly greater effect in regions with few large forests—the Atlantic Coast and Midwest—than in northern regions, where many large forests have regrown since the earlier part of this century. This is shown in the top graph at left, which plots the chance of finding Scarlet Tanagers in forests showing different degrees of fragmentation throughout the East.

"We subdivided the 715 census points from which participants reported observations on Scarlet Tanagers into four regions," says Dhondt. "These were based on physiographic boundaries and major forest types as defined by the U.S. Forest Service." The small "Atlantic Coast" region encompasses Long Island, New Jersey, southeastern Pennsylvania, Delaware, Maryland, and eastern Virginia. The long, thin "Northeast" region starts in southern New England and extends south through most of New York, Pennsylvania, and West Virginia. The huge "Midwest" region encompasses a largely agricultural region from Kentucky and Missouri north to the middle of Minnesota, Wisconsin, and Michigan, and the southernmost part of Ontario. The final area, defined as the "Northern Forest," includes northern Minnesota, Wisconsin, and Michigan, most of Ontario, the Adirondack Mountains of New York, and northern New England.

"In the Northern Forest region, which tends to be heavily forested, habitat fragmentation had no significant effect on the occurrence of the Scarlet Tanager," says Dhondt. "And in the Northeast region, where Scarlet Tanagers are relatively abundant, the effect of fragmentation was not very strong. In both the Atlantic Coast and Midwest regions, however, where forest is scarce, the abundance of Scarlet Tanagers in unfragmented forest is just as high as in the Northeast—but numbers decrease rapidly as forest patches become smaller and more isolated."

"What this means," adds Lab biologist Ken Rosenberg, "is that separate sets of forest-management guidelines must be developed for each species in each geographic region. The simple answer to our original question—'How much forest do tanagers need for suitable breeding habitat?'—is that it depends. Fortunately, we now know what this answer depends on, and we can provide management guidelines tailored to most forested regions of North America."

In addition to data on the presence or absence of tanagers, Project Tanager participants also collected information on potential nest predators and brood parasites (Brown-headed Cowbirds). These data add weight to the idea that smaller forest patches harbor more threats to birds than larger ones. The lower graph plots both the chance of finding breeding Scarlet Tanagers and the chance of finding predators and cowbirds in forests of different sizes in the Midwest. It shows dramatically that in the smallest, most isolated patches—on the right of the graph—Scarlet Tanagers are least likely to breed, while cowbirds, avian nest predators (jays, crows, and grackles), as well as mammalian nest predators (chipmunks and squirrels) are most likely to occur. These are all animals that researchers suggest may be responsible for the low numbers of Neotropical migrants in isolated patches.

But is this relationship causal? Are tanagers less successful in smaller patches because of higher predation or brood parasites, or is some other factor at work? Because tanagers build their nests high up in trees, where they are difficult to observe, we really don't know whether predation or cowbirds pose problems for these birds. To find out, we need to study birds whose nests we can see easily.

And that's just what we're doing. In the summer of 1996, we piloted an expansion of Project Tanager, tentatively called "Birds in Forested Landscapes (BFL)," which will broaden the scope of the project to include several other forest species. Initially BFL is focusing on seven species of North American forest thrushes. Although these birds are common and conspicuous in most forest habitats, researchers believe that many thrush populations are declining. As in Project Tanager, BFL participants will collect data to show how birds respond to variation in their habitats and characteristics of the surrounding landscapes.

The project will answer questions such as: How is the presence and breeding success of thrushes affected by forest fragmentation and land use? How do thrush habitat requirements vary across the range of each species? How do rates of cowbird parasitism and nest predation vary with bird species, geography, patch size, and forest type? What can land managers do to support or enhance thrush populations?

Once the Lab collects sufficient data, BFL will yield "management prescriptions"—descriptions of the kinds and amounts of habitat that will be required to sustain healthy thrush populations. Later, the BFL protocols and procedures will be available for studying additional species of regional concern, such as Cerulean and Swainson's Warblers in the Southeast, Golden-winged and Black-throated Blue Warblers in the Northeast, and Hammond's Flycatcher and Hermit Warbler in the West.

Meanwhile, Dhondt and Rosenberg will continue analyzing Project Tanager data to develop ever-more sophisticated guidelines for forest management. Rosenberg recently became Northeast Regional Coordinator for the huge Neotropical migratory bird program known as Partners in Flight, which is developing the North American Bird Conservation Plan.

"The people who manage our forests want to know what they can do to help birds," says Rosenberg. "But to tell them, we will need much more information on the habitat requirements of most species. We need to develop biologically defensible management goals, based on real data. Both Project Tanager and BFL are designed to get this information, to provide the scientific underpinnings for the Partners in Flight planning process." ■

Within the depths of a large forest, this Scarlet Tanager nest is relatively safe from Brown-headed Cowbirds. In fragmented woodlands, however, these destructive parasites easily find the nests of forest songbirds in which they lay their own eggs.

ALLAN BOVEE

PROJECT PIGEONWATCH

Bringing meaningful bird study to the inner city

Even large cities can provide an excellent venue for bird research. During a Project PigeonWatch session organized by the Lab, these schoolchildren in Syracuse, New York, learn about the process of science while gathering important data on urban pigeons.

MARTHA FISCHER

Sakina Pearson of New York City made a remarkable discovery: "If a pigeon is about to mate and you throw food, it won't mate," she said. "It'll go for the food." Pearson, an urban 4-H peer counselor, was an early participant in Project PigeonWatch, second of the Lab's three National Science Experiments originally funded by the National Science Foundation.

Project PigeonWatch is a collaborative study between Lab scientists and youngsters across the country who are investigating the biology of pigeons in cities. The project was started for two reasons: First, the Lab's education program advocates hands-on, "real science" inquiries as a critical tool for education. Second, the Lab wanted to develop a citizen-science project that would make connections between the natural world and the lives of urban children.

At the core of the project is an unanswered question: Why do city pigeons exist in so many colors? Selective pressures responsible for color variation could include competition for food, color preferences in mate selection, geographic location of a city, or the number of predators that live there. To study these variables nationwide, PigeonWatch participants find flocks of pigeons, count how many pigeons of each color are in each flock, and make experimental observations of pigeon behavior.

The participants' packet for Project PigeonWatch includes an information-packed instruction book, data forms, and a mini-poster showing the different pigeon color types. The project is designed in modules, so that people can participate at many levels—from simply watching and counting the different color types in local flocks, to conducting detailed experiments designed to understand pigeon dominance hierarchies and courtship behaviors.

After two years of pilot and field testing, Project PigeonWatch is just getting under way at the national scale; 300 individuals, youth groups, and classrooms are already signed up. Martha Fischer, PigeonWatch coordinator, explains the attraction: "Teachers and youth leaders like the project because pigeons are common in every city, they're easy to attract and study, and kids can relate to them. These are birds that hang out with their friends and live in tall buildings next to subway tracks."

The first round of PigeonWatch data submission, in April 1996, showed that definite differences do exist in the color composition of flocks across the country. But the data barely hinted at the wealth of information that will be collected and sent to the Lab as the project grows during the next few years.

In the meantime, it's clear that participants are enjoying the project and seeing more than they ever imagined in the oft-maligned bird. Said one youth from New York City: "I never knew anything about pigeons. Now I know a lot, and they have taught me something about life, too. Some kids used to kick at the pigeons. That's wrong. They're part of the wildlife of the city." Echoed another participant from Denver, Colorado: "The pigeon project helped us find beauty in our own neighborhood and taught us to respect city wildlife." ■

THE CORNELL NEST BOX NETWORK

An in-depth study of cavity-nesting birds

"The Nest Box Network is one of the reasons I came to Cornell," says André Dhondt, an evolutionary biologist recently transplanted from the University of Antwerp in Belgium. "To conduct intensive bird research at the continental scope—imagine!"

The funny thing is, the Cornell Nest Box Network didn't exist when Dhondt was named director of Bird Population Studies at the Lab and Morgens Professor of Ornithology at Cornell in 1994. It was just an idea, something he'd proposed to Cornell ornithology professor David Winkler and Lab education director Rick Bonney when he visited the Lab for interviews.

Dhondt, one of Europe's leading ornithologists, had for years been studying Great and Blue Tits. These small birds, related to chickadees, readily nest in boxes, making them excellent subjects for intensive research. Dhondt had been examining the factors that govern tit numbers and maintain their genetic diversity; the reasons that some individuals are more successful than others and why some females mate with their neighbors instead of their own partners; and most recently, the possible effects of habitat fragmentation on tit social organization, genetic diversity, and gene flow.

Dhondt had also studied dispersal, that is, where and how far young birds go to breed. At his field sites he calculated that about 85 percent of the surviving young were never found again—not even in neighboring populations. Where did they go? To find out, he knew that he'd need a mechanism for observing and banding thousands of birds over a vast area and also for finding some of those same birds again. The only solution: a vast network of volunteers.

And on this day in June 1996, as Dhondt leans back happily in his chair, the idea of expanding his work across an entire continent has become reality. Dhondt has just learned that his proposal to the National Science Foundation to develop a continental nest box project, in collaboration with Bonney, Winkler, and John Fitzpatrick, is about to be funded in full—$1.3 million over the next four years.

"We'll start in New York," he says, "developing the prototype and field testing the procedures. In 1997 we'll add a state on the West Coast, possibly California. After that we'll add more states to the network each year until people are sending in data from across the continent. The potential is just unbelievable."

Dispersal is not the only topic that the Network will address. The project will engage participants in experiments to answer additional questions, such as these: Why do Tree Swallows fill their nests with feathers? Do bluebirds prefer clean nest boxes or boxes containing nests from the previous year? In regions affected by acid rain, where the environment has become low in calcium, does providing supplementary calcium to laying females improve the quality of the eggs laid? These and other questions, many of which will emerge from the ongoing research, can be answered only by thousands of amateur ornithologists studying birds from coast to coast. ■

Where do young cavity nesters go when they disperse? Why do Tree Swallows, below, line their nests with feathers? The Nest Box Network will attempt to answer these and other basic questions.

TOM VEZO

A LIBRARY *of* SOUND

BY RACHEL DICKINSON

The largest collection of its kind in the world, LNS is a vital tool for bird conservation

As you walk down the hall toward the Fuertes Room in the Lab of Ornithology, it's easy to pass the gray, metal door on your right without noticing the small sign that reads: "Library of Natural Sounds." But step behind this heavy fire door, into the only climate-controlled section of the Lab, and you'll find an amazing collection of wildlife recordings—more than 100,000 in all—unparalleled in the world both in size and scope. Representing more than 5,300 species of birds, the Lab's Library of Natural Sounds (LNS) also has numerous recordings of reptiles, amphibians, and mammals.

According to LNS curator Greg Budney, the sound library was one of the early components of the Lab of Ornithology. "Lab founder Arthur A. Allen and Peter Paul Kellogg were always looking for ways to help people learn about birds," says Budney. "They realized that sound recordings offered a very revealing detail." By the early 1930s Allen, Kellogg, and Albert Brand were working together to develop the best technology for

We've come a long way. In the 1930s, Peter Paul Kellogg sometimes had to carry his heavy recording gear in a mule-drawn wagon. At right, LNS curator Greg Budney uses a lightweight, modern recording unit.

PHOTO AT RIGHT BY SCOTT THODE

LNS SOUND RECORDING WORKSHOP

STEVE PANTLE

Sound workshop participants brush up on their field recording skills, led by LNS curator Greg Budney (at center, wearing red jacket). Legendary field biologist Ted Parker, far right, devoted his life to studying and recording birds in Latin America. Though he died much too young, his enormous collection of bird recordings provides a lasting legacy for tropical conservation.

Each summer since the mid-1980s the Library of Natural Sounds has sponsored a week-long sound recording workshop in the Sierra Nevada Mountains. There participants learn all the basics they need to know to create high-quality recordings of birds and other wildlife. Led each year by LNS curator Greg Budney and supervising audio engineer Robert Grotke, the course stresses how to make the most of the difficult recording conditions—such as background noise from wind, insects, water, and traffic—that often arise in the field.

The workshop is so popular, some participants return year after year. This does not surprise Budney. "Wildlife recording is an exciting field, and anyone can make a significant contribution—as long as they have adequate equipment and training," says Budney. The LNS workshop fits in well with the Lab of Ornithology ideal of training citizen scientists to gather meaningful data on birds. Budney often calls on past workshop participants to help locate and record particular songs or calls that the library doesn't have. The Sound Recording Workshop has helped build a solid corps of trained volunteer recordists who are now making significant contributions of wildlife recordings from around the world to the LNS collection. *—Rachel Dickinson*

recording bird sounds. At that time sound recording was in its infancy and they had to make their recordings using the only medium available—optical motion-picture film. Today's collection traces the entire development of wildlife recording technology and represents more than 60 years of recording.

"What's sitting on the shelves in LNS is the combined, hard-won knowledge of many people," says Budney. "We can take tapes off those shelves and put them on a set of compact discs and in a matter of weeks give someone birdsong identification skills that might have taken a person 20 years to learn in the past." To that end, LNS is currently collaborating with a software company to produce "Bird Song Master," a computer program that helps people learn bird sounds quickly at home with the aid of their computers.

The LNS collection is a major tool for conservation. For example, in an effort to assess the biological diversity of vanishing rainforests quickly, Conservation International collaborated with LNS to produce "The Birds of Lowland Southeastern Peru," a series of CDs produced by LNS, to train Peruvian biologists how to identify birds by ear. Because each species of bird has its own unique sound, becoming familiar with the sounds of birds that researchers expect to find in a particular habitat will vastly improve their ability to detect them. The Peruvian biologists were amazed. And the CDs were not only effective as learning devices in the lab—by using the tracking function, the researchers could access any sound instantly in the field. They also used these vocalizations to entice birds into responding.

The Library of Natural Sounds has provided training materials and tapes for several other conservation projects, including the U.S. Fish & Wildlife Service's Breeding Bird Survey and a calling frog survey being conducted at the state level and promoted by the National Biological Service. The Canadian Wildlife Service also made extensive use of LNS recordings to create CDs that will help them survey Canada's major biotic zones. And Lab of Ornithology volunteer programs such as Project Tanager have benefited immensely from the audio-training tapes provided to participants. But LNS will continue to have the most impact in the years ahead providing tools for censusing birds and other animals in places such as the New World tropics and Madagascar, where wildlife populations face widespread devastation.

The Library of Natural Sounds is also working on a collaborative project with Russia's Veprintsev Phonotheka of Animal Voices. This collection of 8,500 recordings includes almost 500 of the former Soviet Union's approximately 795 bird species and is currently being repaired, restored, and copied by LNS. This collaborative project, supported by the National Science Foundation, will stabilize the collection, and the Lab of Ornithology will create an archival copy to be held at LNS. Budney says that it is crucial to save this collection. "It will play an important role in Russia as the people there try to preserve Russian wildlife and the habitat that they require."

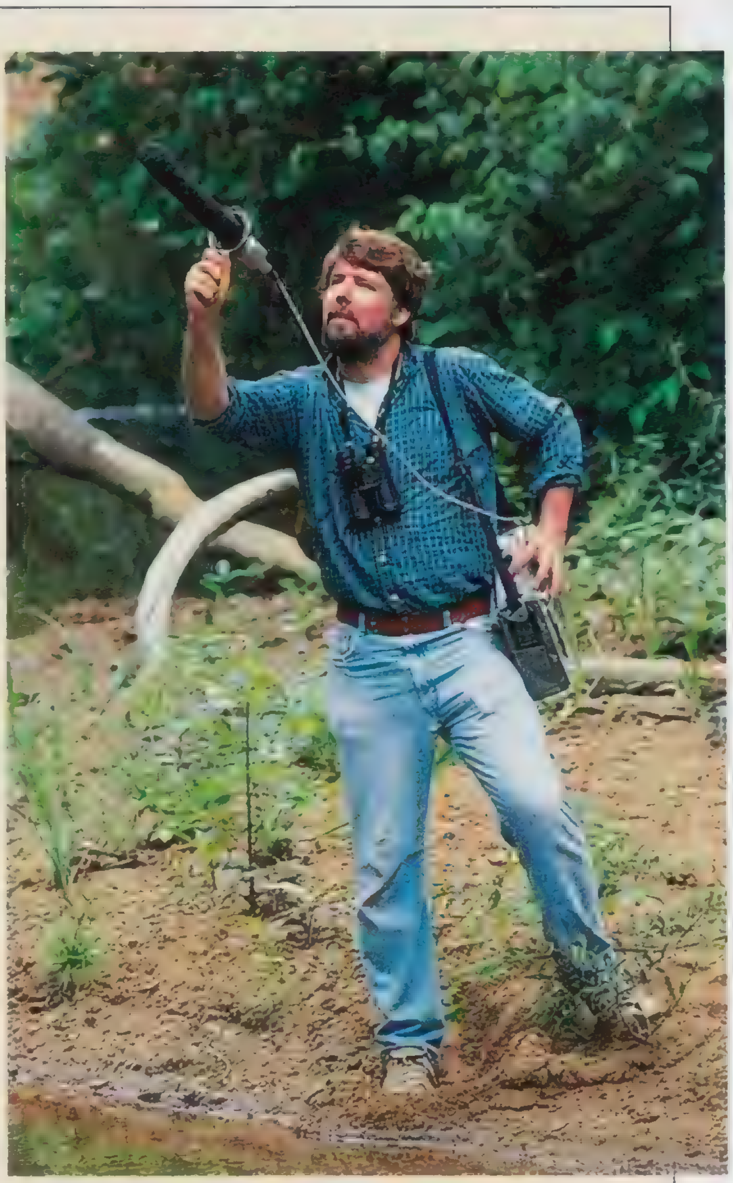
In addition to Budney, the LNS staff includes five technicians, the supervising audio engineer, and two part-time administrative assistants. Budney first came to work at the Library of Natural Sounds as a technician, and he knows every facet of the operation. He says that between 5,000 and 10,000 sound recordings are donated to the collection annually—some are collected by staff and Lab associates, but most come from researchers and private individuals. The only problem is finding enough time, money, and space to incorporate all these new recordings into the collection quickly. But this does not stop Budney from seeking materials that will ultimately help conservation efforts.

Greg Budney worries about not only global environmental issues but also about the micro-environmental issues that concern a conservator. Archivally, the Library of Natural Sounds is at a critical juncture. Soon the entire collection will be converted from an analog to a digitized form (from tape to something like an optical disc). Unfortunately, there is not yet an acceptable digital recording standard for archiving, but recording equipment manufacturers are right on the cusp of supporting the technology necessary to make this change. Budney is enthusiastic about making the switch to digital recordings because it will mean an exponential growth in the accessibility of the sound library, boosting its value immeasurably as a tool for conservation. ■

Rachel Dickinson is a freelance writer based in Freeville, a small village in Upstate New York.

TED PARKER: CONSERVATIONIST

(1953 - 1993)



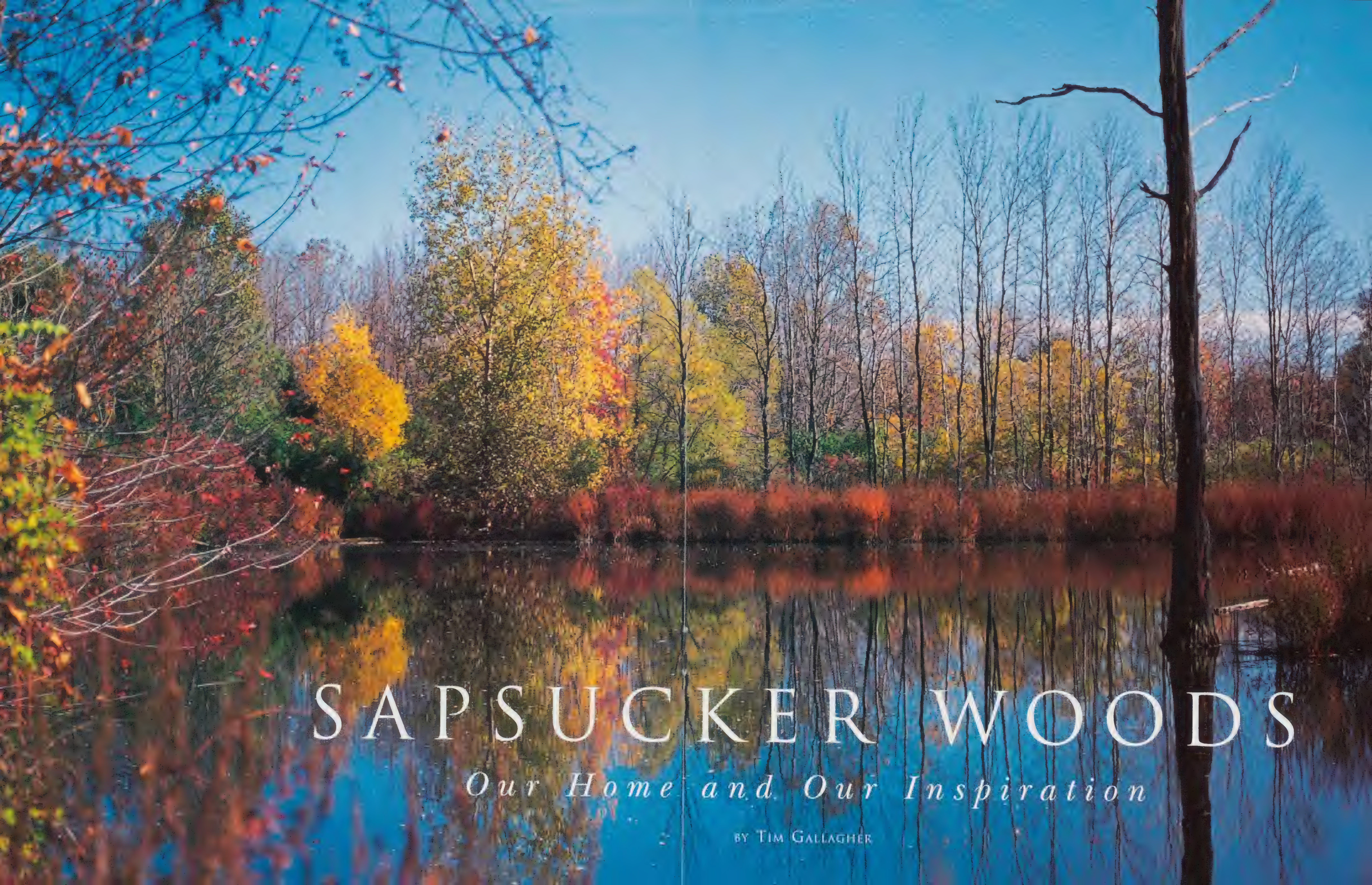
HAROLDO CASTRO/CONSERVATION INTERNATIONAL

It has been more than three years since Ted Parker died in a plane crash, and yet it's almost impossible to write about the Library of Natural Sounds (LNS) without mentioning him prominently. In addition to being an influential member of the Lab's administrative board, he was the single largest contributor to LNS, providing more than 10,000 recordings of bird sounds.

Ted's death was a staggering loss to the Lab and to the conservation community as a whole. He had spent the bulk of his adult life in South America, studying birds and recording their songs. A phenomenal ear birder, he had an encyclopedic knowledge of bird vocalizations and could identify more than 4,000 species by sound alone. He became the world's leading authority on Neotropical bird distribution and identification. Many top scientists and research institutions came to him regularly when they had trouble identifying a bird song or a specimen.

Ted Parker had boundless energy and became a major force for conservation. As director of Conservation International's Rapid Assessment Program (RAP), he personally led teams of biologists and botanists into ecologically threatened areas in the tropics. It was a race against time as they tried to identify and catalog the plants and animals in habitats that often faced imminent destruction. The RAP team was conducting an aerial survey of an Ecuadorian cloudforest in August of 1993 when their airplane crashed, killing Ted and four of his associates.

Though Ted Parker was only 40 years old when he died, he'd already had a significant impact on tropical ornithology and conservation. Many now call him the greatest field biologist of the 20th century. We can only marvel at what he accomplished in his short life and take inspiration from the example he set. There'll never be another like him. —*Tim Gallagher*



SAPSUCKER WOODS

Our Home and Our Inspiration

BY TIM GALLAGHER

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Sapsucker Woods will always be a special place to the Lab of Ornithology. More than just a building site or a quaint address on our letterhead, Sapsucker Woods is our home—a place that has figured prominently throughout much of the Lab's history. With its varied habitats of pond, marsh, swamp, and woodlands, and its miles of trails and boardwalks, Sapsucker Woods is an inspiration to all who work here.

When Lab founder Arthur A. Allen came to Cornell University as an undergraduate in 1903, he spent a lot of time exploring the bird-rich woods, fields, and marshes around Ithaca, New York. One of his favorite places to watch birds was a nameless tract of woods that sat virtually on the dividing line between the townships of Ithaca and Dryden. One spring day in 1909, Allen and his friend, famed bird artist Louis Agassiz Fuertes, visited these woods and found the nest of a Yellow-bellied Sapsucker—the first nest of that species ever recorded in the Southern Tier counties of New York State. Thrilled, Fuertes dubbed the place "the Sapsucker Woods," a name that has obviously stuck.

In the decades that followed, Sapsucker Woods figured prominently in the bird research conducted by Cornell University. It was here that Arthur Allen produced the first sound-color motion picture of a Ruffed Grouse, and where Olin Sewall Pettingill, Jr., (who would later become Lab director) studied American Woodcock as a Cornell graduate student in the 1930s. It was also the place where Peter Paul Kellogg, Albert Brand, and Peter Keane did much of their pioneering work in bird-sound recording, and where Southgate Hoyt studied Pileated Woodpeckers.

FRANCIS HARPER/COURTESY DAVID G. ALLEN

How Sapsucker Woods eventually became the home of the Lab of Ornithology is a fascinating story. In 1951, Arthur Allen wrote an article on bird photography for *National Geographic* magazine. Inspired by the article, Lyman K. Stuart—a Cornell graduate and businessman who lived in Rochester, New York—decided to try out bird photography for himself. Alas, his results were poor. He wrote to Allen asking for photographic tips. The two soon developed a regular correspondence and eventually became good friends. Stuart and his wife even took Allen to Arizona on a vacation so that Allen could teach him the finer points of bird photography first hand. Stuart's photography improved so much that his bird photographs won a major national photo-essay contest sponsored by *Life* magazine.

In gratitude, Stuart asked Allen whether he had a pet project that he could help him with financially. Sapsucker

PHOTO ON PAGES 20-21 BY TIM GALLAGHER

THE LAB THAT DOC ALLEN BUILT

The field of bird study owes much to Arthur Augustus Allen—famed ornithologist, educator, and visionary founder of the Lab. His career, which spanned the early to middle decades of this century, had a crucial influence on the development of ornithology in North America. Allen received his doctorate from Cornell in 1911 and then joined the faculty of the university's graduate school. Soon after, partly as a result of his prodding, Cornell established the first graduate program in ornithology in the United States.

People often date the birth of the Lab to May 18, 1957, when the Sapsucker Woods facility officially opened, but it really is much older. The Laboratory of Ornithology was actually established in 1915, when Allen became a professor of ornithology in Cornell's Department of Entomology. Some have suggested that Allen's department chair allowed him to set up the "Lab"—which at first existed mostly on paper—primarily to ensure that the university would provide sufficient space and status to an ornithology program housed in a department devoted to studying insects.

Nicknamed the "Grad Lab," the new laboratory quickly became a center for graduate studies dealing with birds. From the 1920s to the 1940s, Cornell University was the only institution in North America offering a Ph.D. program in ornithology, and many of America's future leaders in this field conducted their early research at the Lab.

Allen and his colleagues became involved in some innovative research, particularly in sound recording. Along with Peter Paul Kellogg—who would later become codirector of the Lab—and Albert Brand, Allen made some of the first recordings of bird songs and calls. Using heavy equipment that had to be hauled around in a huge panel truck or a horse-drawn wagon, they recorded many species of birds—including the Ivory-billed Woodpecker, which has never been recorded again. Kellogg eventually helped to develop a lightweight, portable tape recorder that revolutionized the field of wildlife sound recording.

Through the middle part of the century, the Lab was constantly changing and evolving. Thanks to Allen's outgoing nature, engaging personality, and enthusiasm, it soon became much more than a training ground for professional ornithologists. "Doc" Allen was always a great promoter and popularizer of birds, and he began reaching out to the public at large, encouraging ordinary citizens to take part in the science of bird study. He lectured widely, led bird walks for local groups, wrote (and took photographs for) magazine articles on birds, and produced a weekly radio program. He firmly believed that the most effective way to promote bird conservation was to develop a strong public interest in birds.

The Lab's emphasis on public education and participation alienated some professional ornithologists, who believed that serious science could be accomplished only by trained scientists. The Lab suffered through a difficult phase during the 1950s and early 1960s, as the Cornell administration struggled to define the purpose of the Lab and its relationship with the university. Should it be a research institution for professional ornithologists and graduate students? Should it be a nature center designed to educate and entertain the public? Or should it blend the two together? Eventually the administrators decided to make the Lab a separate, nonacademic unit of the university. As such, it would not have students of its own, it would not offer college courses, and it would not confer any degrees. In addition, it would have to pay its own way. This last decision led directly to the Lab's emergence as a membership organization.

In the photograph at left—taken in 1909—Lab founder Arthur Allen climbs to a Yellow-bellied Sapsucker nest as Louis Fuertes (left) and James Gutsell look on. Overjoyed at finding the first nest of this species in the area, Fuertes immediately dubbed the spot "the Sapsucker Woods," a name that it carries to this day. Above, Arthur Allen watches the nest of an Ivory-billed Woodpecker in 1935.

Arthur Allen died in 1964, but the seeds that he sowed had taken a firm hold in Sapsucker Woods. Today, while the Lab has reclaimed its academic leadership in ornithology, it has also established the value of public participation in this field. As the Lab and Cornell University work closely together, forming a powerful partnership to promote the study, appreciation, and conservation of birds worldwide, we think Doc Allen would be proud.

—Tim Gallagher

Woods immediately came to mind. Allen suggested purchasing the woods and building a sanctuary, complete with nature trails. He envisioned creating a place that people could visit to enjoy the pleasant scenery, watch birds, and commune with nature—and a place where ornithologists could study birds. "It's not surprising that when Mr. Stuart volunteered to do something for the Laboratory of Ornithology, we all thought of acquiring Sapsucker Woods, already the setting of a number of our research projects," said Allen.

It took imagination and a common vision to create this wonderful place—a safe haven for songbirds, waterfowl, deer, and other wildlife

If you look at photographs of Sapsucker Woods taken in the 1950s, you can see that the woods were rescued none too soon. At that time a major portion had already been cleared. From where the Lab now stands all the way to the state highway stretched an empty field—no trees, no pond, and probably few birds. The Lab archives contain numerous pictures of Sapsucker Woods taken when the sanctuary was being laid out and the building constructed. These large, grainy, black-and-white photographs show Lab staff building nature trails and boardwalks in clear-cut areas, and workmen using heavy machinery to dig the 10-acre pond, which would become a welcome refuge to waterfowl, amphibians, and other wildlife. Instead of destroying the habitat to provide a building site, which happens all too often, Allen and his crew actually improved it, setting back the clock on the devastation that the woods had already experienced.

It took imagination and a common vision to create this wonderful place—a safe haven for any songbirds, waterfowl, deer, and other wildlife that might pass through or choose to make these woods their home. And in the Laboratory that Allen, Kellogg, Stuart, and the others erected in Sapsucker Woods, they envisioned forming a great institution, dedicated to studying birds and firing up public interest in bird appreciation and conservation. What they achieved was truly monumental. Now it is up to all of us—Lab members as well as staff—to carry that vision boldly into the next century. ■

TIM GALLAGHER

Before it became a wildlife sanctuary in the 1950s, many of the trees in Sapsucker Woods had been cleared. Now, thanks to the early efforts of Arthur Allen and Lyman K. Stuart, the trees have grown back, and birders, hikers, and other people who enjoy nature can observe wildlife and stroll the secluded trails.

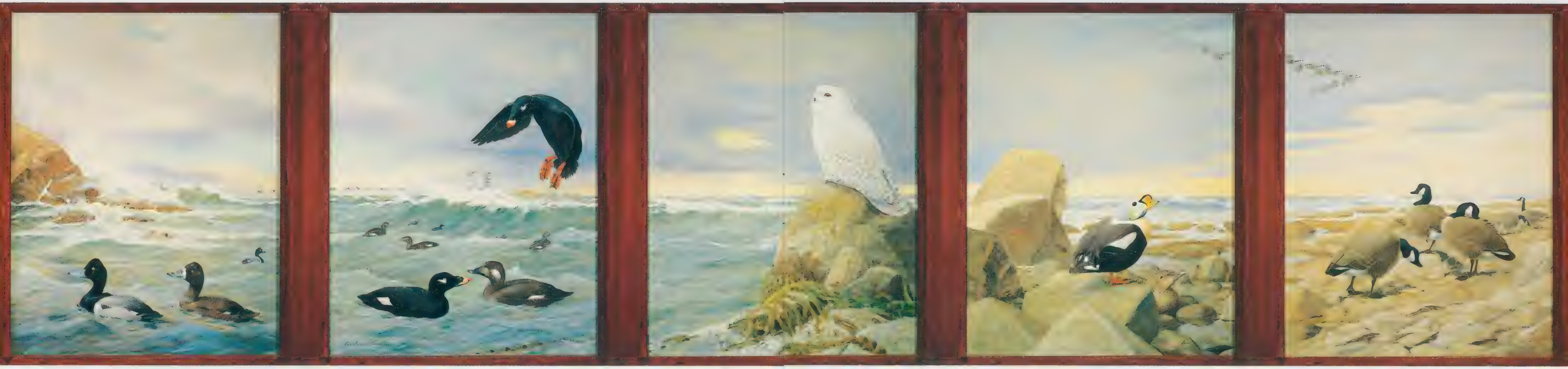
Division of Rare and Manuscript Collections, Cornell University Library

A Portrait of the Artist: LOUIS AGASSIZ FUERTES

BY TIM GALLAGHER

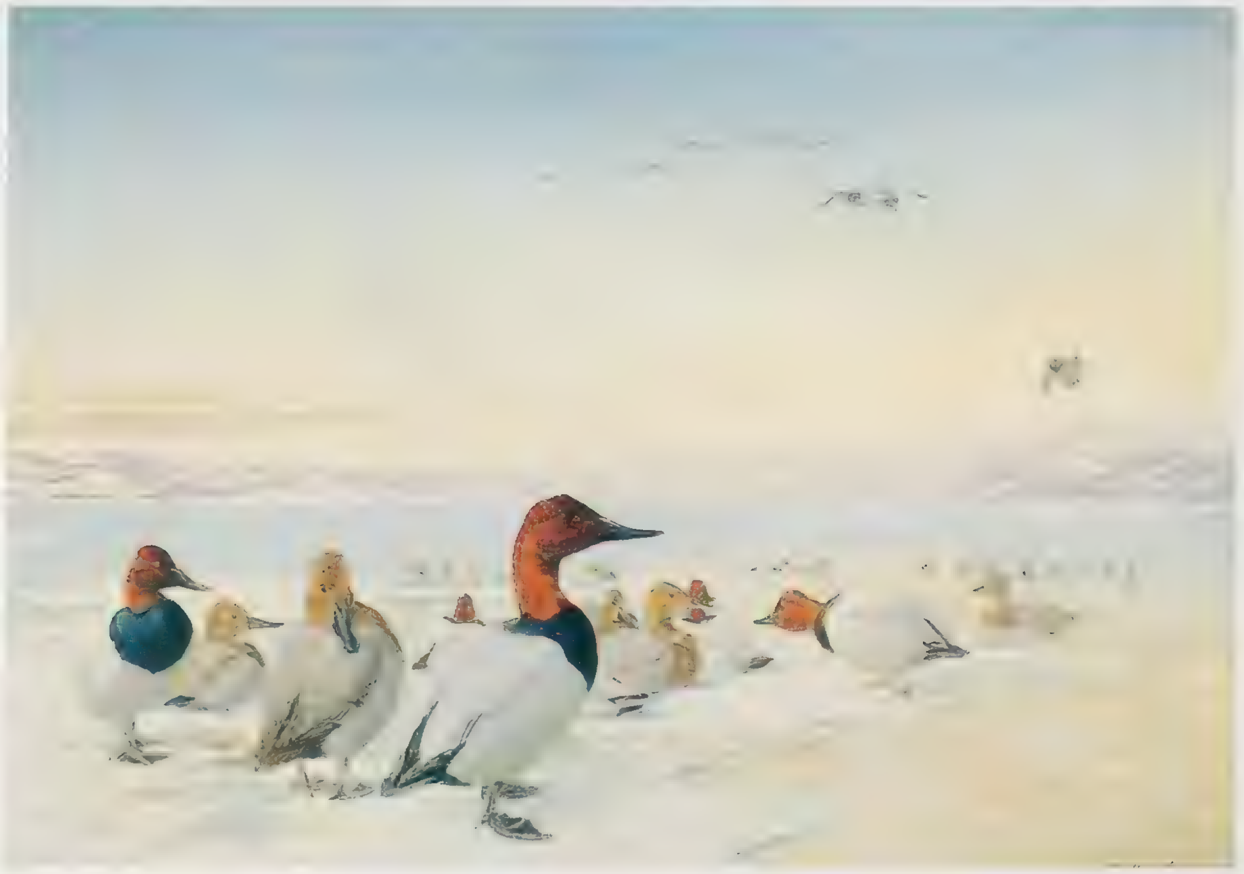
Louis Agassiz Fuertes will always hold a special place in the hearts of Lab staff, members, and friends. Though this world-famous bird artist passed away more than a quarter of a century before the Sapsucker Woods facility opened, his spirit lives on in his many magnificent paintings and sketches that adorn the walls of the Lab. Walk down almost any hallway and you'll see them: a Peregrine Falcon perched regally at its rugged eyrie cliff, a spectacular flight of Whooping Cranes, an Argus Pheasant performing its picturesque courtship display—all exquisite; all capturing perfectly the essence of the living birds that they depict.

But the heart of the Lab's art collection is surely the Fuertes Room, where Monday Night Seminars and other



public functions are usually held. Richly adorned with dark panels of Java teak and glass-fronted bookcases, the room is encircled above by a stunning collection of 24 Fuertes oil paintings. These dramatic paintings depict a variety of bird species, ranging from waterfowl, game birds, and shorebirds to hawks and owls. Famed ornithologist Frank M. Chapman of the American Museum of Natural History wrote of these paintings that they represent some of "the best work Fuertes ever did."

The interior of the Fuertes Room was originally part of an ornate private study in a 66-room, Tudor-style mansion in New Haven, Connecticut. The mansion's owner, Frederick Foster Brewster, commissioned Fuertes in 1909 to design the room and create the paintings. Years later, Brewster generously bequeathed the study to the Lab, along with a sufficient sum of money to pay for its interior to be painstakingly removed and reassembled here. Dedicated in 1968, the room was immediately embraced by birders, and now it's difficult to imagine a time when the Fuertes Room was not part of the Lab. As ace birder Ned Brinkley once said as he stood to speak at a Monday Night Seminar: "It's great to be here in the Sistine Chapel of Ornithology."



These pages provide a small sampling of the fabulous oil paintings that adorn the upper walls of the Fuertes Room—"the Sistine Chapel of Ornithology." At top, a section of paintings along one wall of the room; above, a portrait of Canvasbacks.

JON REIS PHOTOGRAPHY

It was appropriate that these paintings should come to Ithaca (Fuertes's hometown) and to Cornell. Fuertes had a lifelong connection with the university. His father, Estevan Fuertes, was a professor at the university when Louis was born, and later became dean of the school of engineering. And young Fuertes became a Cornellian himself when he enrolled as a freshman in 1893. Before he graduated four years later he was already firmly embarked on his career as an artist. His "big break" had come through a friend in the Cornell Glee Club, who introduced him to his uncle, Elliott Coues—the foremost ornithologist in North America at the time. Through his many contacts, Coues obtained several art commissions for Fuertes and eventually convinced a major publisher to choose Fuertes to illustrate *Citizen Bird*, a beginning bird guide for children. This book virtually launched Fuertes's career.

"If the birds of the world had met to select a human being who could best express to mankind the beauty and charm of their forms, their songs, their rhythmic flight, their manners for the heart's delight, they would unquestionably have chosen Louis Fuertes."

Fuertes became one of the most accomplished bird artists of all time. A prolific painter, he illustrated books and magazine articles, created commissioned art pieces, and often accompanied biological expeditions, serving as the official artist. He traveled across North America, as well as to Central and South America, Europe, and Africa. He once accompanied John Muir, John Burroughs, and other noted naturalists and scientists on a steamship voyage to Alaska. But one of his longest and most ambitious expeditions was a trip he made to Abyssinia in 1927. Soon after returning, he drove to New York City to show Frank Chapman the sketches and paintings he had made on the journey. On his way home Fuertes collided with a train at a railroad crossing and he was killed instantly, tragically ending a brilliant career at the early age of 53.

Several years earlier, in 1922, Fuertes had begun presenting an annual series of lectures at the University. Lab founder Arthur A. Allen said of his teaching, "During my fifty years at Cornell I have at no other time nor in any other classroom seen such a spontaneous response from students and from colleagues as that which followed Louis Fuertes's lectures. His early death robbed Cornell of one of the greatest teachers it has ever known, as well as the greatest bird artist."

Louis Agassiz Fuertes was born in 1874, just 23 years after John James Audubon's death. Fuertes was a worthy successor to the earlier master bird artist. Though Audubon is often credited with moving the art of bird illustration from stiff recreations of study specimens to images that closely resembled real birds, Fuertes went further, practically breathing life into the bird images he created. At a memorial service several months after Fuertes's death, Frank Chapman said: "If the birds of the world had met to select a human being who could best express to mankind the beauty and charm of their forms, their songs, their rhythmic flight, their manners for the heart's delight, they would unquestionably have chosen Louis Fuertes." ■

WHY STUDY WHALES?

The Lab's Bioacoustics Research Program examines animal sounds across the broad spectrum of nature

BY TIM GALLAGHER

Here at the Lab of Ornithology, it's not uncommon to get a phone call or letter from a member asking: "Why in the world are you studying whales at a bird research institute?" It's a fair question, but the reasons are compelling. First, many of the scientific questions that bioacoustics researchers are trying to answer are the same no matter what kind of animal they're studying. "Whether you're dealing with an insect the size of a pencil eraser or a whale the size of this entire laboratory, you'll find that you're addressing the same basic behavioral questions," says Christopher Clark, director of the Lab's Bioacoustics Research Program (BRP). "Why is the animal producing this particular sound in this way? What are the benefits of this behavior to the individual animal in terms of survival and reproduction? I see similar behaviors across the entire spectrum of animal groups."

Clark is fascinated by the enormous physical efforts that various animals go through in producing their distinctive songs or calls, sometimes even endangering their lives. "Some frogs lose up to 10 percent of their body weight singing in a single night," he says. "Birds put themselves at risk by sitting on high, exposed perches and singing loudly. There's a cost to all this. They certainly make themselves much more vulnerable to predators. So why do they do it? This is the kind of question we're trying to work out with all the animals we study."

Kurt Fistrup, assistant director of BRP, adds that it is important to be able to compare acoustic behaviors between widely differing species to test the validity of your research. "If you can show that the same principles hold true for a 40-meter-long blue whale in a tropical ocean and a five-inch songbird in a forest, then you can be relatively certain that the adaptation you observed is genuine," says Fistrup. "By finding common principles in the way these vastly different animals behave in these widely disparate habitats you can boost your confidence in your conclusions."

A more obvious reason why it is important for BRP to continue studying whales is that many of the technical innovations developed through whale research have direct applications to bird study. For example, several years ago Clark and his colleagues developed a method for using sound to census bowhead whales as they migrate along the coast of Alaska. They set up an array of microphones, each placed about a kilometer apart, and recorded the vocalizations of the passing whales. The computer program BRP designed compared the differing times it took for the whale sounds to reach each of the microphones and pinpointed the exact location of each calling animal. This greatly boosted the effectiveness of the census, minimizing the chance that the same whale would be counted more than once.

The Bioacoustics Research Program has made remarkable strides in the study of marine mammals, developing new computerized techniques to track whales, identify their sounds, and study their behavior. Many of the research methods the group pioneered are directly applicable to bird study. Lab associate Bill Evans, at right, monitors night-migrating songbirds, using an adapted version of a "pattern recognition" computer program that BRP created to identify whale calls.

SPERM WHALE ON PAGES 28-29 BY FLIP NICKLIN/MINDEN PICTURES. PHOTO AT LEFT BY TIM GALLAGHER

Cornell graduate student John Bower is using a similar setup now to study the vocal interactions between Song Sparrows on adjacent territories. His research focuses on how a bird's song and movements influence its neighbors' behavior, how a bird's singing is related to its position on its territory, and the role that song plays in setting up or avoiding territorial conflicts. Using this microphone array and computer system, Bower can monitor the singing and movements of many birds on several adjacent territories at the same time. This system is also being used in two European studies. All of these studies would have been difficult if not impossible to accomplish without this technology, which was developed and paid for through whale research.

Several years ago, BRP programmers developed a computer software program called "Canary" that has applications across the entire field of bioacoustics research. Translating sounds into easily usable data that can be compared objectively had always been a major problem in bioacoustics. The technology for producing sonograms—visible images of a sound showing its frequency and duration—was developed in the 1940s, and it was a major step forward, but sonograms were not easy to use. Clark remembers spending hours as a graduate student in the 1970s printing out sonograms on sheets of typing paper, two-and-one-half seconds of sound on each sheet. He had to tape them together into massive continuous strips and then examine them carefully by eye. "It was painfully slow," he says. Using Canary, a researcher can now play back a sound into a computer and see an instant visual display, which can then be edited, compared, and analyzed on the computer.

Canary has been an absolute boon for bioacoustics researchers, and now BRP programmers have taken the technology one step further and created "pattern recognition" software. First developed for whale study, this software enables a computer to recognize the spectrographic pattern of a sound and automatically determine which species is calling. This helped researchers to interpret hours of underwater recordings supplied to the Lab by the U.S. Navy, eliminating the painstaking and incredibly time-consuming work of researchers who had in the past had to listen to hours of tape, trying to pick out the calls by ear.

The pattern recognition software developed for whales had almost immediate applications for bird study. When Bill Evans came to the Lab three years ago seeking help in developing a method for recording, identifying, and counting the flight calls of night-migrating songbirds (*Living Bird*, Spring 1996), BRP researchers immediately recognized that they already had the basic computer program. "We were able to find solutions for Bill Evans's project immediately because we'd already built the pattern recognition program for whales," says Clark. "It was a simple matter to adapt it to birds." Before this technology was developed, Evans had to listen to nine-hour tapes from each of his recording locations, identifying each call himself. Now a computer can do everything automatically on site, producing data on bird numbers and identities within hours that can be accessed via a telephone line.

Cornell University graduate student John Bower examines the singing behavior and territorial interactions of Song Sparrows, above, using computer technology that the Bioacoustics Research Program originally developed to census bowhead whales in Alaska.

LANG ELLIOTT

It shouldn't be too surprising that BRP would be studying whales, insects, small mammals, and other sound-producing animals. Chris Clark is definitely a believer in the value of cross-fertilization between scientific disciplines. As a graduate student working on a doctorate in electrical engineering, he was always fascinated by the technology available for sound study. But he was also appalled that so little of this technology was being applied to biology. "I would come across all these great tools being developed in engineering and I'd wonder: Why don't we use any of these in biology?" says Clark. "A lot of times the two fields just don't talk. Too often in biology you wait until something falls into your lap before you use it." Whether it involves bringing together engineering and biology or ornithology and whale research, Chris Clark is dedicated to bridging the gaps between varying disciplines, helping to advance the quality of scientific research in every field of study that he and the BRP staff approach. ■

BUILDING A BETTER BIRD COLLECTION

BY RACHEL DICKINSON

Cornell's Ornithological Collection Provides a Window into the Past—and the Future

Bird specimens provide a unique study resource for scientists, and a reference that they can return to again and again. Below, Kevin McGowan, associate curator of birds, examines study skins in the Cornell collection.

Across the highway from Sapsucker Woods Sanctuary, not far from the old Tompkins County Airport terminal, stands a nondescript World War II era building that seems to fade into the landscape like a Snowy Owl in a swirling snowstorm. But trudge up the barely enclosed exterior stairs to the second floor of this brown cinder block building, pass through the heavy metal door, and you enter Kevin McGowan's world. McGowan is Cornell University's associate curator of birds and he has spent the last seven years sorting, cataloging, and re-housing the fabulous collection of bird skins, skeletons, eggs, and nests known as the Cornell Ornithological Collection.

Open a drawer in one of the collection's rows of cabinets, and you may find yourself catching your breath at the dazzling array of colors of some of these specimens. And because they are protected from light, the color is essentially as vivid today as it was when the specimens were collected. When McGowan placed two skins side by side—one collected by famed bird artist Louis Agassiz Fuertes in 1911 and the other collected in 1989—it was impossible for me to tell which skin was more than 80 years old.

The collection has an interesting history. Established shortly after the founding of Cornell University, some of the earliest specimens date from a university-sponsored expedition to Brazil in 1868. The list of notables who have contributed specimens to the collection includes John James Audubon, Louis Agassiz Fuertes, Arthur A. Allen, George M. Sutton, Charles Sibley, Ludlow Griscom, and many others.

Though it is medium-sized by international standards, Cornell's collection is comprehensive, making it useful for comparative research and excellent for teaching. Fourteen Cornell classes from such diverse fields as behavioral ecology, engineering, and landscape architecture used the collection during the fall semester last year. The collection includes half the species of birds in the world, with specimens from every continent and more than 125 countries. In total, the collection contains approximately 37,000 round skins, 350 flat skins, 150 spread wings, 4,300 skeletons, 1,200 fluid-

TIM GALLAGHER (2)

preserved specimens, 3,200 eggs, 700 nests, 100 tissues, and 1,000 mounted birds.

Today the Cornell collection swells by a couple of hundred specimens each year, primarily through the salvage of accidentally killed birds (road kills, window kills, tower kills), trades with other institutions, and some judicious collecting. The collection's faculty curator, David Winkler—a professor in Cornell's Section of Ecology and Systematics and a member of the Lab's administrative board—hopes to expand the collection in the future. "If the Lab's program in Systematics and Collections is to be the peer of the other Lab programs we'll need to increase the size of the collection," he says. Winkler compares the current collection to a set of encyclopedias with many of its volumes missing. He wants to reduce the number of missing "volumes" to make the collection a more effective tool for bird study and conservation. "I want students to be able to test the merit of an idea right here, before bothering to take a trip to the American Museum of Natural History [a five-hour drive away in New York City] or calling a curator in another state or country to send specimens so that the students can rigorously test an hypothesis," says Winkler.

Lab director John Fitzpatrick is a firm believer in the value of biological collections. "Collections are windows into what the living world looked like at a given place and time," he says. "They allow us continually to go back and study the individual animals and plants that were present at that place and time in history." Because our understanding of the natural world is constantly changing, and we are always trying to apply new scientific methods to answer age-old questions, Fitzpatrick believes it is vital to be able to re-examine actual specimens used by scientists such as Darwin or Sibley when they were developing their theories, because we can continue to learn from them.

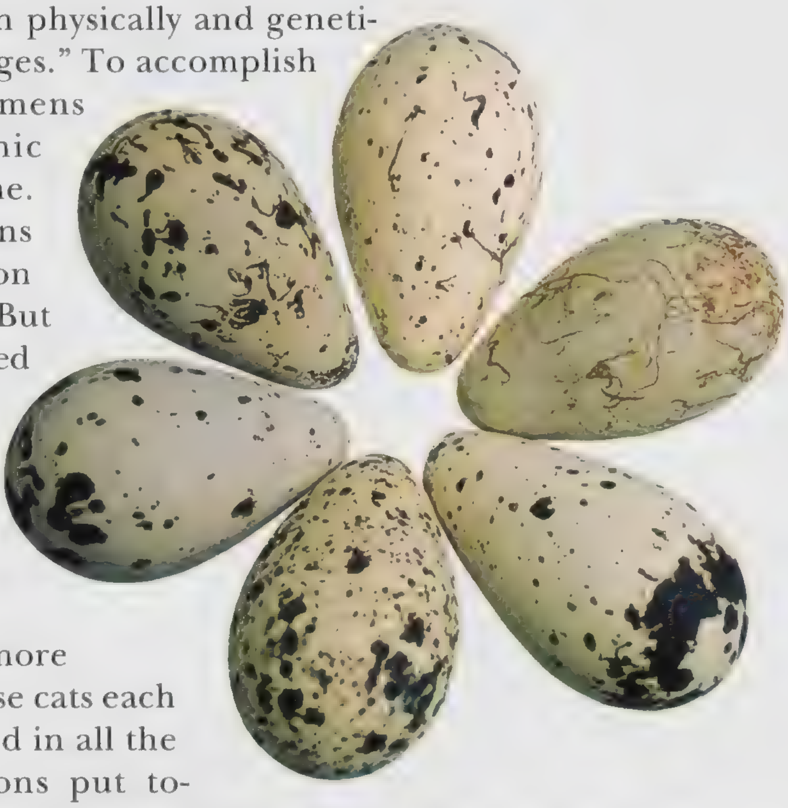
Proponents of collections sometimes find themselves having to defend collecting. "People ask us why we need hundreds of flickers in a collection or why we need to keep collecting when we have so many specimens already," says McGowan. Both he and Fitzpatrick answer with one word: variation. Like people, no two birds are alike, and by studying variation across wide geographic areas, we can look at the evolution of a species. To find out, for example, how Northern Cardinals vary across their range, you need to understand the variation in individuals at specific sites, and you must also have a large enough statistical sample from many different sites to be able to compare them across their entire range.

Questions about variations within species, and even what constitutes a species, are crucial to Fitzpatrick's definition of conservation. "It is our responsibility not just to protect a few wild areas, but also to protect opportunities for evolutionary change," says Fitzpatrick. "We need to understand the biology, the geography, and the ecology of a species' limits in order to understand what forces are at work on that species. And we need to understand how species vary—both physically and genetically—across their ranges." To accomplish this, you need specimens from wide geographic areas and also over time. That is why collections build up drawers upon drawers of specimens. But these specimens, collected over time and often from widely separated areas, represent only a tiny fraction of the total population of a given species.

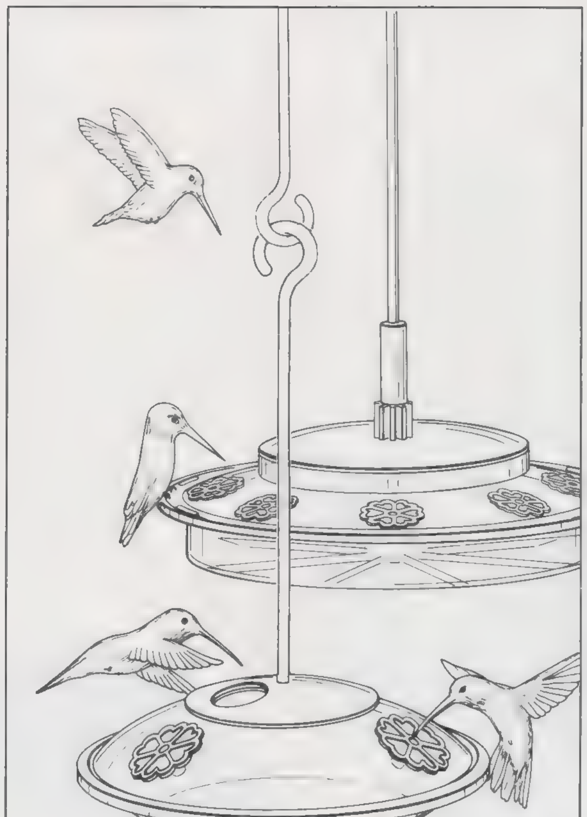
"Many thousands more birds are killed by house cats each year than are contained in all the world's bird collections put together," says Lab biologist Kenneth Rosenberg. "There's definitely no harm in collecting birds at the level that it's taking place today." A consummate scientist, Rosenberg speaks with passion about collections. "Collections are a permanent record we can come back to," he says. "You don't have to trust someone else's data analysis or impressions. You can actually go back and re-measure specimens armed with new scientific information and a fresh eye."

The Cornell Ornithological Collection currently occupies half of the second floor of the cinder block building, where it has resided in "temporary storage" since 1968. McGowan and Winkler received a National Science Foundation (NSF) grant to upgrade the condition of the collection. In addition to replacing some of the ancient metal cabinets and rehousing many of the specimens, they purchased the hardware (and the personpower) to place all the catalog information in a computer database, which makes responding to queries much easier. Now researchers can access the database 24 hours a day via the Internet (http://www.bio.cornell.edu/vertcollections/cubird.html) and search through the specimen lists themselves, rather than having to call McGowan or his assistant.

After years of dwelling in limbo—being moved from building to building in the Univer-



Bird collections are an important tool for studying and comparing bird species. These Common Murre eggs from Cornell's collection, pictured above, clearly show how greatly bird eggs can vary, even within the same species and populations of birds.



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sity, and finally put in temporary storage five miles from campus—the future of the collection is finally beginning to brighten. Thanks to the NSF grant and the curatorial efforts of McGowan and Winkler the collection is in excellent shape. John Fitzpatrick is determined to provide a permanent home for the collection at the Lab of Ornithology, as part of a major building renovation and expansion of the current Lab facility. And Cornell University has pledged to add a top systematist to the Lab faculty—someone who will study the variation and diversity of birds.

The Cornell Ornithological Collection will continue to be managed by the university's Section of Ecology and Systematics. By housing it here, the Lab will be strengthening its ties to the university as a whole, promoting a free exchange of ideas among some of the top scientists in the nation and the world. The new techniques of analyzing and comparing the DNA makeup of specimens has ushered in a renaissance in the field of systematics, providing amazing new insights into what constitutes a species, how particular species evolved, and how they are related to other species.

The Lab will be the perfect place for major research in bird systematics, because it will not only have the specimens from the Cornell Ornithological Collection, but also the vast collection of wildlife recordings in the Library of Natural Sounds, the computerized sound analysis techniques being perfected by the Bioacoustics Research Program, and the growing data sets that Bird Population Studies is amassing on the nesting ecology of birds throughout North America. Knowledge gained from all the Lab's research efforts will have a major impact on bird conservation. By learning more about what constitutes a species and how and where new ones are forming, researchers will be better able to identify the vital areas that must be preserved to save the earth's dwindling natural diversity. ■

Rachel Dickinson is a freelance journalist who frequently writes about birds.

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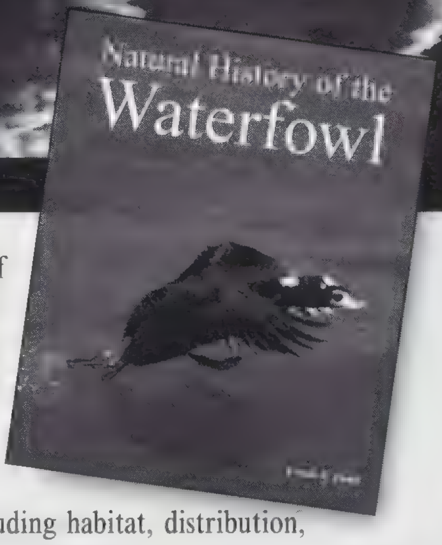

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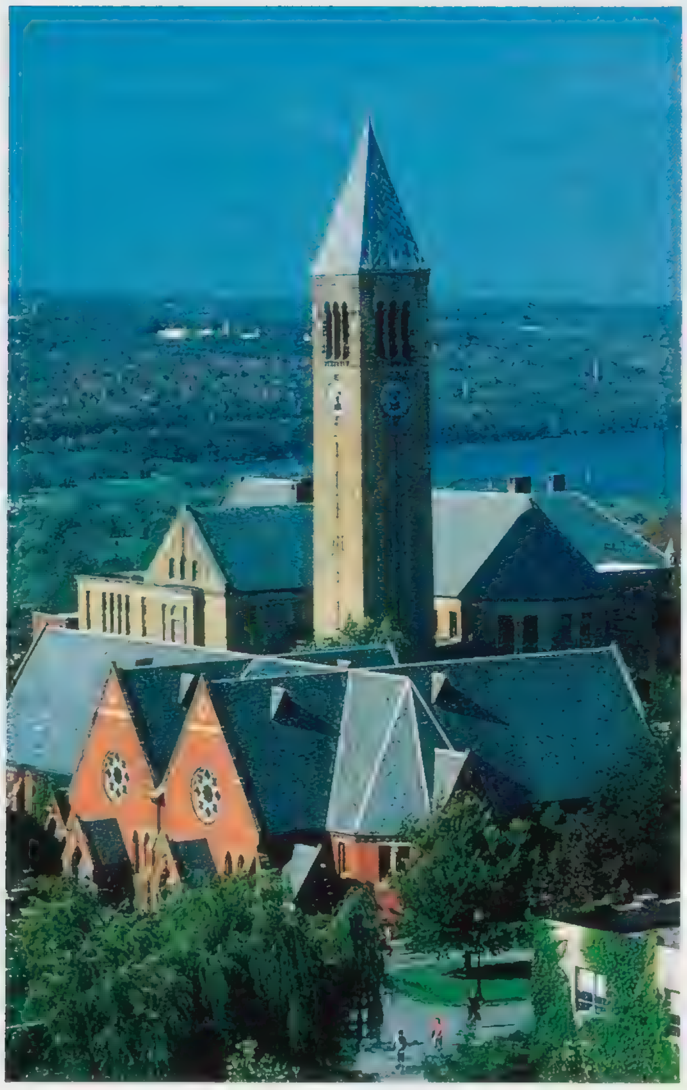
THE CORNELL CONNECTION

Cornell University and the Lab of Ornithology form a vital partnership for bird study and education

The Lab of Ornithology is fortunate to be part of Cornell University—a world-famous educational and research institution set in picturesque Ithaca, New York. Widely recognized as one of the premier centers in the world for studying ecology, behavior, evolution, and genetics (as well as engineering, communication, computer science, and education), Cornell draws some of the brightest undergraduate and graduate students from a diversity of fields. The university is justifiably renowned for its excellence in bird study. It was here that Arthur A. Allen became one of America's first professors of ornithology in 1915—the same year that the Laboratory of Ornithology was established.

Now, 81 years later, the connection between the Lab and Cornell is stronger than ever. The university is essential to the Lab of Ornithology. In addition to attracting outstanding students, Cornell fosters interdisciplinary research and outreach, providing opportunities for faculty, staff, and alumni to participate in the Lab's diverse programs. Ornithology is a broad field at the university, involving many departments and sections, including Ecology and Systematics, Neurobiology and Behavior, Natural Resources, Psychology, Electrical Engineering, Veterinary Science, and more. But the Lab also has much to offer the university. Although the Lab is not an academic department and does not grant degrees, it serves as a center for student activities in a number of fields. Both undergraduate and graduate students come to the Lab regularly to participate in research, attend seminars, study in the library, look at bird art, or just spend time in a pleasant environment, watching birds and walking the nature trails.

Several of the Lab's senior staff regularly present lectures or teach classes on campus, and some accept graduate students through faculty appointments in Cornell academic departments. Indeed, both Lab director John Fitzpatrick and Bird Population Studies director André Dhondt are full professors in the university's Section of Ecology and Systematics, teaching courses in bird biology, ecology, and conservation biology, and directing the studies of several graduate students. Bioacoustics Research Program director Christopher Clark is senior scientist in Cornell's Section of Neurobiology and Behavior (NB&B). In addition to co-teaching a course on bioacoustics with Lab administrative board member Ronald R. Hoy, Clark directs the studies of a number of graduate students in both NB&B and Electrical Engineering. Education Program director Rick Bonney works with several graduate students and presents guest lectures in the Department of Communications. And Kevin McGowan, curatorial associate of the Lab's Systematics and Collections program, presents lectures to a wide range of classes that visit the bird collection, and also teaches occasional classes in avian systematics, specimen preparation, vertebrate collecting, Neotropical canopy biology, and tree climbing.



CHARLES HARRINGTON/CORNELL UNIVERSITY PHOTO

In addition, a number of prominent Cornell professors have close ties with the Lab. Charles Walcott, director of the Lab for more than 14 years, is a professor in NB&B who studies bird navigation and acoustic communication. Stephen T. Emlen—Cornell's Jacob Gould Schurman Professor, well known for his studies of the evolution and dynamics of family systems in social birds—sometimes writes for this publication. And David Winkler, associate professor in the Section of Ecology and Systematics, faculty curator of birds, and member of the Lab's administrative board, regularly brings classes to the Lab, and teaches special courses, such as last spring's bird-banding workshop. Winkler is also co-investigator with André Dhondt in the Lab's latest major venture in citizen science—the Cornell Nest Box Network.

Although the Lab does not offer formal university classes, educational opportunities abound, in Ithaca and around the country. Anyone can attend the Lab's Monday Night Seminars, held in the Fuertes Room each week during both fall and spring Cornell semesters. There a broad variety of prominent ornithologists, birders, writers, artists, photographers, musicians, and others who have a significant involvement with birds share their work with Lab members and friends. Interested people can also take part in the Lab's annual Sound Recording Workshop, led each summer by Library of Natural Sounds curator Greg Budney. Or they can sign up for the eight-week-long Spring Field Ornithology course, taught by Lab associate Steve Kress. Beginning this year, the Lab is collaborating with tour company Wings, Inc. to present a series of popular birding workshops across the United States. People who don't want to travel to take a class or workshop can enroll in the Lab's popular Home Study Course in Bird Biology, an in-depth, self-paced introduction to all aspects of bird study—physiology, behavior, singing, migration, and more.

The Lab has become a "global clubhouse" for professional ornithologists, students, and amateur bird watchers alike. Our picturesque setting at Sapsucker Woods Sanctuary invites people to explore the quiet paths, visit the observatory, and take part in our research programs. The Lab provides a "university without walls," allowing people from all walks of life to become involved in a real way with the process of science and bird conservation. Cornell students, as well as the general public, can gain hands-on experience, conducting meaningful scientific research that will help determine conservation and wildlife management strategies in the years ahead. ■

The Lab of Ornithology provides many research opportunities for Cornell students, both undergraduate and graduate. Above, a student at a Lab bird-banding workshop carefully removes a chickadee from a mist net. At left, a student assists Kevin McGowan, associate curator of birds, with his field work on American Crows.

TIM GALLAGHER (2)

TOM MANGELSEN

SOARING INTO THE FUTURE

The Cornell Laboratory of Ornithology has evolved significantly since its founding early in this century. At that time, the Lab was just a sub-unit of Cornell's Department of Entomology, made up of Arthur Allen and his graduate students. Together they conducted ground-breaking work in developing ornithology as a science.

In 1957, the Lab moved from the Cornell campus to Sapsucker Woods and established a small institute dedicated to research and teaching. But the organization was really only just beginning to grow. By the end of the 1980s, the Lab had helped pioneer the field of bioacoustics, built the world's premier natural sound library, and brought its magazine, *Living Bird*, to award-winning prominence. The Lab began to nurture its long-standing tradition of volunteer-based research in the 1990s, and today has matured into a national leader in citizen science, teaming with amateur ornithologists to accomplish far-reaching goals in research, education, and conservation.

These successes have helped the Lab earn crucial endowments from a growing family of supporters and develop its members into an important team of allies in bird study and conservation. Through this support, the Lab now has five major research programs—Bird Population Studies, Library of Natural Sounds, Bioacoustics Research Program, Systematics and Collections, and Conservation Science—all headed by leadership-caliber scientists. These are sewn together by an innovative team of educators who help translate late-breaking research into knowledge usable by everyone. The entire venture, in turn, supports a network of conservation partnerships outside the Lab, from local land managers to the largest international conservation organizations.

As with any highly evolved soaring creature, the Lab's essence and its future remain defined in its roots. During the new and challenging millennium ahead, humans will protect what they best understand and enjoy. The Lab will continue to help save birds, by fostering people's knowledge and enjoyment of them. Our goal is nothing less than to save what is most precious about our planet.

John W Fitzpatrick

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